



**SOLVAY**

asking more from chemistry®

# Personal Care Solutions Guide

LATAM





## **A commitment to sustainability**

Solvay puts into practice a sustainable development policy called Solvay Way because we believe our future depends upon upon the responsible way in which we conduct our current activities. Solvay Way encompasses three interlinked, equally important spheres: the Environment Sphere, the Societal Sphere and the Economic Sphere. Based on a framework of responsibilities, Solvay Way allows Solvay sites and businesses to conduct self-assessments of their practices and establish action plans that promote continuous progress. Solvay is developing sustainability assessment tools following Life Cycle Analysis principles to design innovative products and processes answering today's and tomorrow's challenges, covering the field of sustainability in a comprehensive way (climate change, renewable resources, water, health, eco-systems). At Solvay, the way we do business creates sustainable value for our customers through innovation and partnerships.

## **A leading position as a supplier in the personal care industry**

Solvay holds a unique and leading position among chemical suppliers in the industry: our product portfolio, built and completed over the years through a constant series of acquisitions, offers the widest range of several functional chemicals. Essential to the creation of personal care formulations, our diverse surfactants and polymers, combined with the expertise of our formulators, can help provide efficacious yet unheard of synergistic combinations of ingredients, to formulators in constant need of innovative solutions. Our global footprint also allows production of materials in different regions. Thanks to this, we can provide local support to manufacturers wherever they ambition to expand, in particular to supply emerging markets.

## **An innovation fueled by formulators' needs, market trends & consumer insight**

Solvay's Research & Innovation process relies on a clear understanding of the challenges formulators encounter to deliver certain benefits to ever more demanding consumers. Nowadays, consumer expectations regarding personal care formulations are far more complex than ever before. Cleansing, for instance, is now a given and shower products must go beyond just delivering cleanliness. The consumers' awareness of how sensitized their hair and skin are due to daily abuse, and the rise of a need for health and well-being, will have to translate into products that will not only clean, but also deliver higher end benefits, such as moisturization, repair, anti-ageing, etc. We translate regional as well as global trends into formulation challenges which our formulators can then tackle, with Solvay's comprehensive and diverse portfolio of ingredients and chemistries at their disposal.

## **A research process commensurate to the task, supported by in-house sensorial assessment**

Our upstream expertise in robotic and microfluidic combinatorial methodologies, combined with our cleansing and conditioning technologies, allow us to look for, and find synergistic combinations with unrivaled efficacy. Formulations are designed in a holistic way: their efficacy as much as their sensoriality are now routinely assessed by trained panels through salon-like sessions, so that formulation technical development is not done at the expense of the consumer's sensorial experience. Finally, stability upon storage at room temperature and freezing, as well as artificial ageing at high temperature, are provided, to complete a picture which formulators can start from with a higher degree of confidence. With these tools in our hands, we provide in a timely fashion, innovative solutions and technical support to the most demanding formulators confronted with shorter and shorted developmental periods.



## **Solvay, your preferred partner in creating innovative personal care products**

### **An innovation driven by Consumers' Needs**

Our network of R&I, tech-support and regulatory experts helps you create new formulations designed to meet specific consumer benefits and claims.

From concept to formulation, from the lab to production, from regulatory registration to product launch, Solvay is your partner every step of the way.



## Performance Concentrates For Cleansing & Aesthetics

Sulfate-free, structured & all-purpose solutions: Miracare® & Mackadet®  
Aesthetic Concentrates: Mackpearl®

Performance  
Concentrates

## Conditioning Solutions For Hair

Natural-based & synthetic polymers: Jaguar®, Polycare® & Mirapol®  
Esters & Silicones: Mackaderm® & Solvasil®  
Cationic surfactants: Fentacare® & Mackine®

Conditioning  
Solutions

## Functional Active

Natural & synthetic conditioning agents: Mackaderm® & Polycare®

Functional  
Active

## Rheological Solutions For Hair, Body & Skin products

Natural, naturally-derived and synthetic rheological agents: Jaguar®,  
Rhodicare®, Rheozan® & Rheomer®

Rheological  
Solutions

## Solubilizers For Hair & Skin products

EO-based & EO-free solutions: Alkamuls®

Solubilizers

## Emulsifiers, Emollients & Esters For Hair & Skin products

EO-based & EO-free solutions: Alkamuls® & Mackaderm®

Emollients,  
Humectants,  
Emulsifiers

## Anionic Surfactants

Sulfate-based anionics: Mackol® & Rhodapex®  
Non-sulfated specialties: Rhodacal®, Geropon® & Dermalcare®

Anionic  
Surfactants

## Amphoteric Surfactants

Conventional betaines: Mackam® & Mirataine®  
Non-betaine specialties: Mackam®, Mirataine® & Miranol®

Amphoteric  
Surfactants

## Nonionic Surfactants

Pearlizing agents: Mackester® & Alkamuls®  
Foam booster & thickeners: Mackamide®, Mackamine® & Rhodameen®

Nonionic  
Surfactants

# Performance Concentrates





# Performance Concentrates

To satisfy consumers ever more in need of new benefits, Personal Care formulations on the market keep growing in diversity. Solvay's long standing offer for cleansing blends revolves around key market trends:

- **Multi-purpose:** as consumers and formulators face challenges in cost of goods, smart multifunctional combinations help optimize manufacturing while maintaining performances.
- **Mildness & respect:** a growing concern among consumers, who notice their skin and hair are more sensitized. Our extra-mild line answers the need for extra gentle cleansing solutions.
- **Sensoriality:** besides cleansing, consumers expect rinse-off products to provide enhanced, original sensorial experiences (such as foam texture, fragrance delivery) which will help buy their loyalty to a particular brand.



	Product Name	INCI	Solids (%)	Preserv.	Properties
<b>Multi-purpose</b>  Sulfated blends Cleansing formulations	<b>Mackadet® EQ 171</b>	Ammonium Laureth Sulfate, Decyl Glucoside, Disodium Cocoamphodiacetate, Cocamidopropyl Betaine	40-45	Free	Mild blend for intimate hygiene. responds rapidly to viscosity building with the simple addition of sodium chloride. Amide-free, no formaldehyde or parabens.
	<b>Miracare® 2MHT</b>	Disodium Lauroamphodiacetate, Sodium Trideceth Sulfate, Hexylene Glycol	48-52	Free	An amphoteric-rich mild concentrate with good flash-foam properties. Recommended applications: baby washes, intimate hygiene.



<b>Mildness &amp; respect</b>  Sulfate-free Specialty Blends	<b>Miracare® SOFT 313</b>	Sodium Cocoyl Glycinate, Sodium Lauroamphoacetate, Cocamidopropyl Hydroxysultaine	33.5 -35.5	Free	An amphoteric-rich sulfate- and EO-free blend optimized to deliver superior cleansing while prioritizing gentleness on skin. Generates a luxurious foam and an exceptional sensorial experience, leaving the skin soft and smooth.
	<b>Miracare® SOFT S525</b>	Cocamidopropyl Hydroxysultaine, Sodium Cocoyl Isethionate, Sodium Methyl Oleyl Taurate, Cocamide MIPA, Decyl glucoside	55-58	Free	Next generation mild sulfate-free concentrate, that provides flexibility, sustainability and cost effectiveness.



<b>Sensoriality</b>  Specialty Structured blends & soaps	<b>Miracare® SLB 365 W</b>	Sodium Trideceth Sulfate, Sodium Lauroamphoacetate, Cocamide MEA	48-52	Free	Cost-effective grade, improved stability in presence of mineral oils (eg.p etrolatum). Ideal for extra moisturization delivery.
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With **Miracare® SOFT S 525**, an innovative cleansing concentrate sulfate-free surfactant, Solvay offers its raw material expertise and formulation capability to find smart, synergistic and stable combinations for formulators to design mild rinse-off products. It delivers both strong foam features (volume, texture, quick rinse) while retaining the mildness to the skin.

Key features

- Provides dense and creamy leather
- Allows to build mild cleansing formula for skin & hair contributing to solve challenges such as foam and viscosity
- Possibility to target various hair type from normal to damaged hair by selecting wisely the anionic surfactant and cationic polymer in combination with the **Miracare® SOFT S 525**

**INCI name:** Cocamidopropyl Hydroxysultaine, Sodium Cocoyl Isethionate, Sodium Methyl Oleyl Taurate, Cocamide MIPA, Decyl glucoside

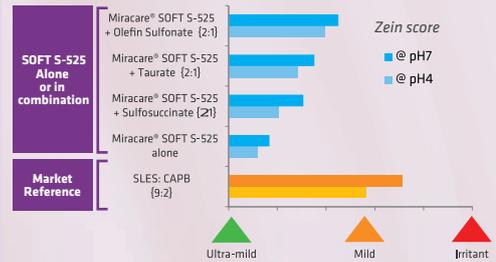


Improved mildness

Challenges to solutions

Consumer benefits

The **Miracare® SOFT S 525** reduces irritation vs standard SLES/CAPB chassis and provides universally milder response, regardless of the anionic mixed with it.



1. Solve challenges typical of sulfate-free chassis (cost of goods, thickening, foam volume & quality, chassis complexity)

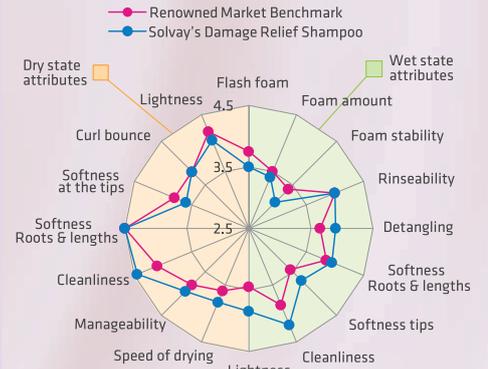
3. Deliver the solution to manufacturers in a robust, package that allows flexibility

2. Provide efficient conditioning in particular to damaged hair, with a balanced sensory experience for the consumer

- An optimized surfactants combination that is flexible and adaptable: based on 5 key ingredients, it ensure foaming, texturing and conditioning, and can be used with different anionics to create SKUs for many different hair targets.
- A guidance as to which cationic Jaguar® should be used, to help formulators create shampoos that deliver care for different hair types, from fine to very damaged.

Sensory Evaluation (Half head testing) of Solvay Damage Relief shampoo for damaged Caucasian hair

- Contains less than 15% active surfactant, % solids-22% vs 33% for the benchmark
- Provides **good viscosity & foam (flash, volume)**, attributes difficult to achieve sulfate-free chassis
- Delivers **high fiber softness from roots to tips** and improved lightness, cleanliness vs benchmark



# Miracare® SOFT 313

## A unique cleansing system that delivers on gentleness & sensorial experience

With **Miracare® SOFT 313**, an innovative sulfate-free and EO-free concentrate; Solvay offers its raw material expertise and formulation capability to find smart, synergistic and stable combinations for formulators. It delivers both strong foam features (volume, texture, quick-rinse) while retaining the mildness to the skin.

### Key features

- Cold processable
- Recommended use level: 20 - 35% as supplied for conventional formulations and up to 99% for concentrated cleansers
- pH in use > 6.5 for optimally stable formulations
- Preservative-free, self-preserved at high pH
- Strong notable synergy with rheological agent Rheomer® 33T

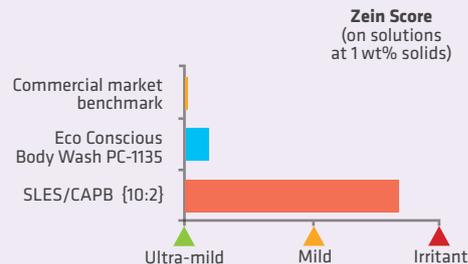
**INCI name:** Sodium Cocoyl Glycinate, Sodium Lauroamphoacetate, Cocamidopropyl Hydroxysultaine.

Mild & respectful

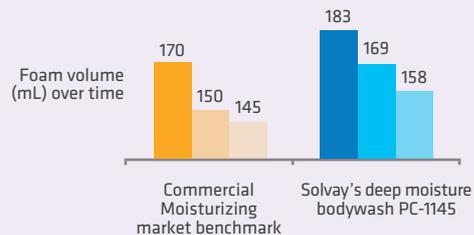
Provides foam & skin sensory

Protect, moisturize

**Clinically tested as non-irritant & non-sensitizing** on 50 Panelists during a 6 weeks study, we illustrate how superiorly mild with a bodywash entirely based on Miracare® SOFT 313 (the "Eco-Conscious" bodywash PC-1135).

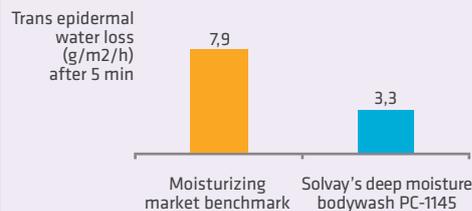


**In-shower sensory experience greatly improved**, with body washes showing improved foam features, compared to a renowned market benchmark. The foam shows a fast, clean rinse, leaving the skin soft, moisturized.



Hart de George foam volume measured at 30, 150 and 300 sec, from left to right.

**Claiming instant prevention of water loss from the skin** becomes possible with economical shower gel made of 10% active surfactant !

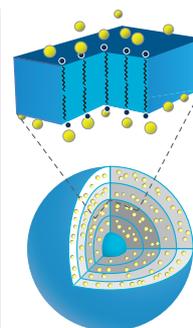


Delphin vapometer measurements on the skin of 6 subjects.

As the consumer's need for self-indulgence and pampering grows ever stronger, increasingly complex products provide richer sensorial experiences that will help drive their loyalty to a brand. **Miracare® SLB 365 W** allows formulators to develop cleansing products that offer a unique and exceptional in-use experience.

Key features

- Cold processable
- Recommended use level: 28-45% as supplied
- pH in use: 4.5 – 5.5, compatible with Sodium benzoate
- Amounts of oil efficiently suspended: up to 20%
- Preservative-free
- Strong synergy with Solvay's cationic Jaguar® and quaternized surfactants such as **Fentacare®**

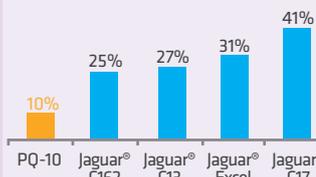


**INCI name:** Sodium Trideceth Sulfate, Sodium Lauroamphoacetate, Cocamide MEA, sodium chloride

Flexible,  
versatile,  
efficient

**Stabilize high loads of insoluble actives** without using suspending agent. **Host and work synergistically** with cationic molecules (surfactants, guar, proteins) to maximize deposition where needed the most.

Percentage of oil deposited on wool (i.e. model skin substrate)

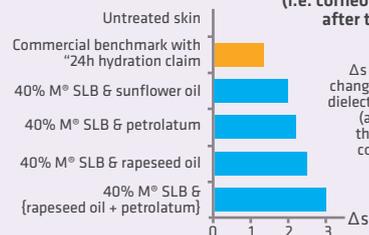


Formulation	
Miracare® SLB	33%
Cationic polymer	0,35%
Sunflower oil	15%
Salt	2.0%

Focus on  
consumers'  
needs

**Help create solutions that deliver on a diversity of challenging claims:** "24 hour skin moisturization", "Reduced color fading", "Targeted care of highly damaged hair", "Long-term fragrance"...

$\Delta s$  = Skin Hydration (i.e. corneometry 24h after treatment)



$\Delta s$  denotes the change in the skin dielectric constant (a measure of the skin water content) after treatment.

Spa-like  
experience

**A luxurious texture that allows creating spa-like products.** Salon-tested by professionals, the formulations based on **Miracare® SLB** outperform leading market benchmarks.

Half-head tests  
Vs. a leading market benchmark  
(Schrader Institute, Germany)



# Aesthetics Concentrates

Aesthetics appeal to one the senses that consumers will first experience and continually expect. Formulators work with pearling which need specific manufacturing steps (such as the melting and cooling of EGDS) or with polymeric opacifying agents (ie. styrene/acrylates copolymers) for which Solvay offers alternatives that meet the recent **non-microbeads** regulation.

**Pearl/Shine**

**Opacity**




Aggregates

Needle / Plates

- Wide range equivalent to market standards
- Broad offer including preservative-specific grades
- Several surfactant bases available
- Outstanding Pearl Shine & Opacity
- Versatility in different surfactant bases
- Unmatched performance: - 40% lower loading
- Substantial cost-in-use savings

Marketing Corner

**The use of aesthetic agents**

The use of aesthetics agents (i.e. EGMS, EGDS, mica, styrene/acrylates copolymer) in rinse-off products is stable over the years (source: Mintel GNPD)

55%

2013-2015

Proportion of shampoos in North America containing aesthetic agents

25%

2013-2015

Proportion of bodywashes in North America containing aesthetic agents

As the market is switching to formulations more respectful of both consumers and the environment, new challenges arise in aesthetic agents as well: to support the claims made on the formulation that will contain them in the future, pearling and opacifying blends will in turn have to become sulfate-free, non-ecotoxic and biodegradable.

### Sulfated pearls to the formulators' liking

(Amide-free or not, EO-free or not...)

Product Name	INCI	Solids (%)	Preserv.	Properties
<b>Mirasheen® STAR K</b>	Water, Glycol Distearate, Sodium Laureth Sulfate, Myristyl Alcohol, Cocamidopropyl Betaine	29-35	MIT/MCIT	An amide-free, anionic-rich high performance pearling agent with diamond shine and excellent opacifying properties. Highly cost-effective, recommended inclusion: 1-3% as is.
<b>Mirasheen® S-188</b>	Water, Glycol Distearate, Sodium Laureth Sulfate, Cocamidopropyl Betaine	41-59	MIT/MCIT	An amide free, high actives liquid pearl system that easily disperses at room temperature and delivers a high shine, pearly appearance.

### Sulfate-free specialty pearls & opacifier

& Sulfate-free microbead replacement

<b>Mackpearl® 100</b>	Water, Glycol Distearate, Steareth-4	19-21	MIT/MCIT	Sulfate-free, nonionic pearl. Ideal for "sulfate-free" cleansers. Nonionic liquid pearl designed for use in cold process lotions and soap formulations.
<b>Mirasheen® SSE</b>	Alpha Olefin Sulfonate, Glycol Stearate, Cocoamidopropyl Betaine	44-46	DMDM hydantoin	Sulfate-free, EO-free anionic pearl & opacifier. This amide free pearl system incorporates 16% Glycol Stearate into a liquid and provides a gentle pearled effect completely cold processed. Opacifies at lousage levels.
<b>Mackadet® OPR-1</b>	Water, Glycol Distearate, Cocamidopropyl Betaine, Glyceryl Stearate	41-44	Sodium Benzonate	Non-microbead opacifier, sulfate-free, EO-free, amide-free. Vegetable-derived. Liquid, cold processable. Appearance adjusted with inclusion level.

### Product Focus

#### Mackadet® OPR-1

Now banned from cosmetics on a national level, microplastics designate synthetic plastic particles of initial size <5mm which are not retained in water treatment filters and end up in oceans, where their bioaccumulation and toxicity to marine life raises great concern. As experts consider the ban extends beyond the polyethylene (PE) microbeads originally targeted, to for instance, well-known particulate opacifiers such as styrene/acrylates copolymers, Mackadet® OPR-1 offers an alternative to formulators, which is more respectful of the environment. Easy to incorporate as a liquid and allows for cold process production.

#### Key features:

- **Free of sulfated surfactants**
- **Sustainability Profile**
  - 84% vegetable origin (%RMw)
  - 89% renewable carbon (%RCI)
  - Functional components all readily biodegradable, not bioaccumulable
- **Formaldehyde- and paraben-free**

#### Opacity of formulation vs. concentration of Mackadet® OPR-1

(spectrophotometer, 11mm diameter vials)



0.00% 0,25% 0,50% 1,00% 1,50% 2,00% 3,00% 4,00%

# Conditioning Solutions





## Cationic Polymers

## Natural & synthetic conditioning agents and deposition aids for hair and skin

Cationic polymers are, by nature, strongly attracted to anionic surfaces, such as damaged keratinic substrates: human hair, once damaged through natural or artificial weathering, as well as scalp and skin, once stripped from surface lipids, are measurably anionic.

Cationic polymers bind to damaged sites and can provide lasting benefits even by themselves, by neutralizing electrostatic charges that cause fly-away and frizziness in hair. In shampoos and body washes, they also aid in the deposition of soothing, nourishing or treating ingredients, such as oils or anti-dandruff actives, through a well-documented phenomenon called flocculation.

Cationic polymers can be either purely synthetic or naturally derived. Guar gum, a natural polymer extracted from seeds, is modified to a variety of compositions and MWs to produce Jaguar®. Synthetic copolymers, on the other hand, are artificially built from individual monomers to reach higher degree of functionality in particular the cationicity, hence the affinity for keratinous surfaces.

### Sustainability corner

SOLVAY way

### Helping the guar farmers in India

A multi-year project to teach and promote sustainable agricultural practices among **rain-fed guar bean farmers** in India's desert region of Bikaner.

Launched in 2015, Solvay's Sustainable Guar Initiative aims to empower farmers with tools and knowledge to cultivate the crop through **good agricultural practices**, resulting in more continuous, high yield production.

The program will improve the livelihood of farmers, protect local resources and ensure a durability of income for guar bean farmers while considering the impact of climate change into their activities. Already more than 4,000 farmers in 20 villages have registered to participate to the project supported by L'Oréal and Henkel.

We commissioned Technoserve, a global nonprofit organization, to spearhead the on-the-ground implementation. Their experts train farmers and show how sustainable farming practices can be implemented in a practical way. By comparing the crops grown on the demonstration land with those grown under normal circumstances, the farmers can quickly recognize **the benefits of sustainable methods**.

Our efforts also focus on expanded societal inputs helping women establish kitchen gardens, providing various vegetables for their own families, as well as a potential secondary income source.

Training farmers on good agricultural practices to: improve their income & transfer knowledge



Improve safety and hygiene practices of the families & develop mutual aid and unity in their community



Involve farmers in actions towards protection of their environment



# Polymers

**Normal hair**  
Slightly damaged hair, fine hair, elderly hair, baby head-to-toe

**Significant damage**  
Colored hair, highlights, frizzy/ethnic hair

Product Name	INCI	Origin & form	Properties
Jaguar® Excel	Guar Hydroxypropyl-Trimonium Chloride	Natural (Powder)	Suitable for transparent formulations. Versatile grade for normal hair, baby / kids hair, fine or thinning hair, men's hair. Cosmos.
Jaguar® C162	Hydroxypropyl Guar Hydroxypropyl-Trimonium Chloride	Natural (Powder)	Double-derivatized guar suitable for transparent formulations, suitable for thin natural hair. Non-ecotoxic.
Jaguar® C500 STD	Guar Hydroxypropyl-Trimonium Chloride	Natural (Powder)	Light conditioning with enhanced wet combability and squeaky clean hair feel. Recommended for fine hair and volumizing shampoo. Cosmos/Opaque formulations.
Mirapol® PQ 74	Polyquaternium-74	Synthetic (Liquid)	Amphoteric polymer used to deliver high conditioning and delivery performance in rinse-off personal care applications. It gives light hair feel and has strong affinity with dimethicone to boost deposition.
Mirapol® A15	Polyquaternium-2	Synthetic (Liquid)	Clear Very low molecular weight, highly charged cationic polymer, it is recommended for use in hair coloring systems, and 2-in-1 body wash and shampoo.
Jaguar® C14S	Guar Hydroxypropyl-Trimonium Chloride	Natural (Powder)	Standard grade. Suitable for opaque formulations, delivers excellent wet / dry hair and skin benefits (detangling, softness, suppleness, shine...) thanks to its substantivity and efficient delivery of insoluble conditioning agents (oils, emollients). Jaguar® C13S is the self-hydrating version. Cosmos.
Jaguar® C13S	Guar Hydroxypropyl-Trimonium Chloride	Natural (Powder)	
Jaguar® C17	Guar Hydroxypropyl-Trimonium Chloride	Natural (Powder)	Suitable for opaque formulations. Superior hair conditioning and wet combing, best-in-class oil deposition aid. Suitable for thick, frizzy, ethnic, unruly hair. Not recommended for thin hair. Cosmos.
Jaguar® Optima	Guar Hydroxypropyl-Trimonium Chloride	Natural (Powder)	Suitable for opaque formulations. This specialty grade is versatile and can address all sorts of hair targets, as the level of conditioning can be adapted by increasing the dosage. Ideal for silicone-free claims. Cosmos.
Jaguar® LS	Hydroxypropyl Guar Hydroxypropyl-Trimonium Chloride	Natural (Powder)	Superior deposition (i.e. of natural oils, silicones, etc) on damaged hair from both sulfated & sulfate-free chassis. Non-ecotoxic.

# Benefits of Solvay's line of naturally-derived conditioning polymers

The habits of formulators speak for themselves: in North America, the use of naturally-derived cationic guar in shampoos, bodywashes & hand soaps, has never been this strong. As the industry addresses consumers' concern for hair and skin that are increasingly damaged and sensitized, cationic guar efficacy remains unrivaled.



**25%** → **44%**  
2013 2015

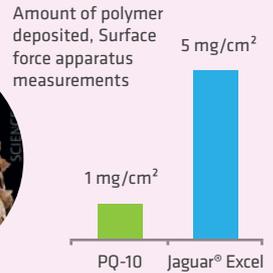
Evolution of the proportion of shampoos designed for damaged hair in North America containing a cationic guar

**12%** → **16%**  
2013 2015

Evolution of the proportion of bodywash & liquid soap for damaged skin in North America containing a cationic guar

## Deposit

... onto damaged hair & skin upon showering or shampooing, damaged keratinous surfaces being anionic. Their high substantivity makes cationic guar resistant to rinsing, thereby providing conditioning.



## Strengthen

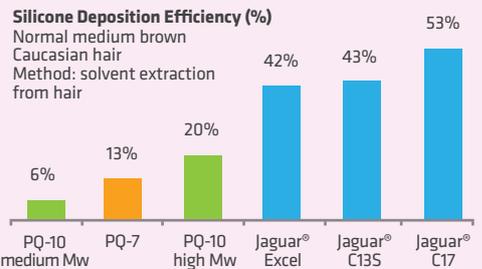
... weak hair & soothe damaged skin. Over time and multiple applications, cationic guar reinforce damaged hair and contribute to reducing fiber breakage. They also decrease blood capillary flow, hence reduce skin redness.



**Fiber strengthen, mN**  
SLES/CAMA (2:1), Jaguar® Excel 0.2% - Salt 1% - pH = 7

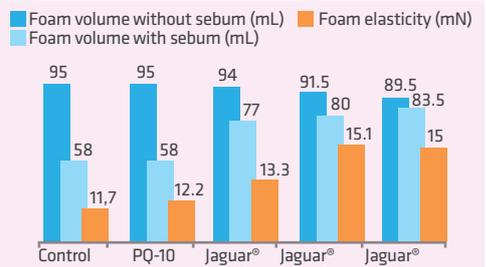
## Deliver

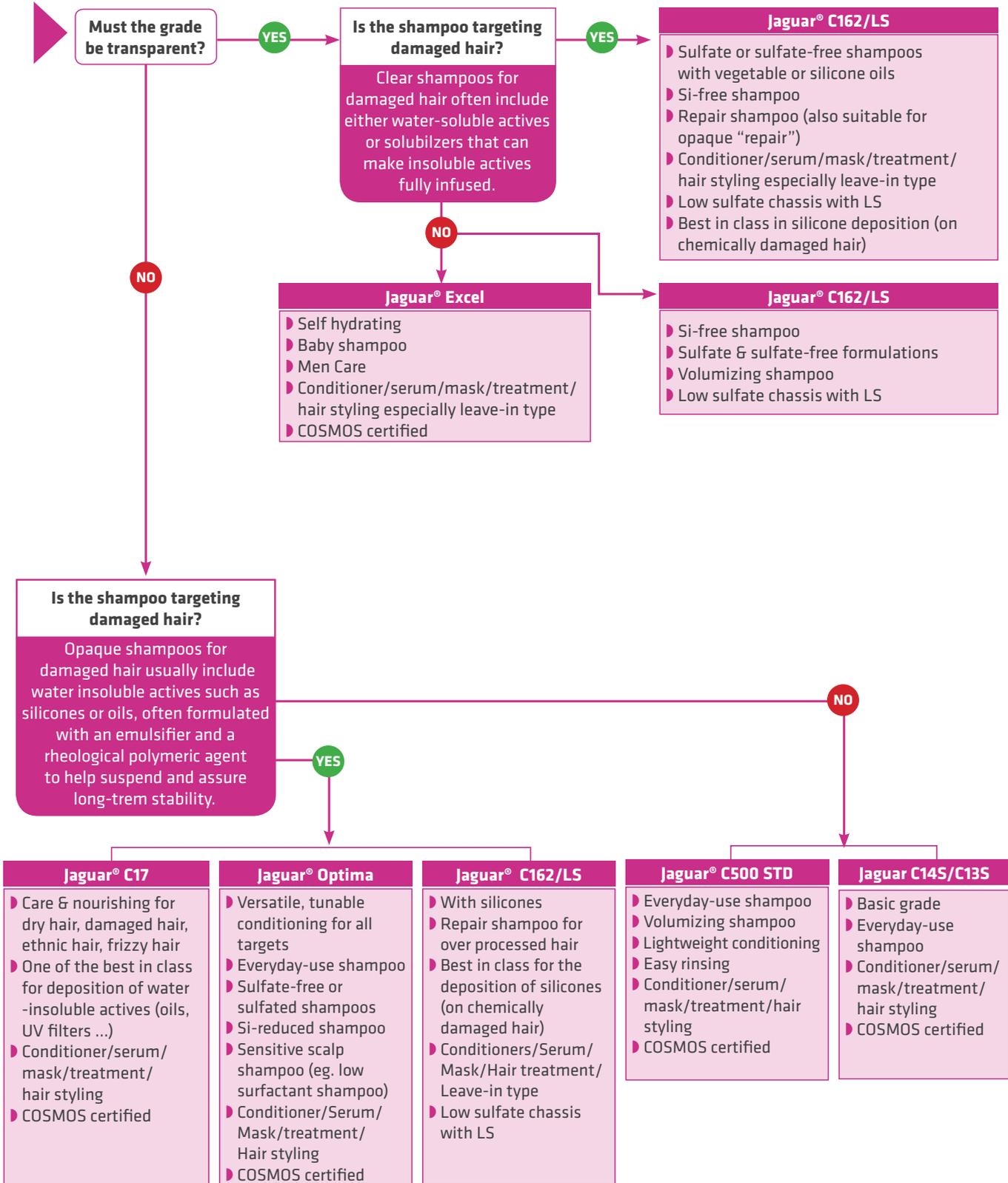
... water-insoluble ingredients to hair and skin far more efficiently than other cationic polymer technology on the market. Silicone oils, natural oils, anti-dandruffs, anti-UVs.



## Boost

... foam attributes (volume, texture) even in the presence of sebum, making it firmer, more elastic, contributing to also making the whole sensorial experience more pleasurable.





## Cationic Surfactants

Conditioning agents in conditioners, masks and creams

	Product Name	INCI	Short name	Type	Cationic Active (%)
<b>Normal hair</b>  Lightly damaged hair, fine hair, elderly hair, baby head-to-toe	<b>Mackernium® CC-112P9</b>	Isostearamidopropyl Ethyldimonium Ethosulfate and PEG 9	ISAPEDES	Sulfated Quat	71-75
	<b>Mackernium® SFES</b>	Sunfloweramidopropyl Ethyldimonium Ethosulfate and PEG 9	SFAPEDES	Sulfated Quat	70-75
<b>Significant damage</b>  Colored hair, bleached hair, frizzy/ethnic hair	<b>Mackine® 301</b>	Stearamidopropyl Dimethylamine	SAPDMA	Amido Amine	> 90
	<b>Mackernium® SDC-85</b>	Stearalkonium Chloride	STAKC	Chloride Quat	68-72
	<b>Fentacare® 1631 30</b>	Cetrimonium Chloride	CTAC	Chloride Quat	68-70
<b>Extreme Damage</b>  Split ends, multiple bleach, Tie & dye, straightening	<b>Fentacare® 2231MS I 90</b>	Behentrimonium Methosulfate	BTMS	Sulfated Quat	78-82
	<b>Fentacare® BTMS 25EF</b>	Cetearyl Alcohol and Behentrimonium Methosulfate	BTMS	Sulfated Quat	23-27
	<b>Fentacare® BTMAC I 80</b>	Behentrimonium Chloride	BTAC	Chloride Quat	78-84
	<b>Fentacare® BTAC DPG 70</b>	Behentrimonium Chloride	BTAC	Chloride Quat	67-70

Form & Appearance	Properties & Applications	Recommend dosage, as is wt %		Secondary Cationic most frequently mixed with
		If used alone	in combination with another cationic	
Clear liquid	Light conditioning, easily removed by the next shampoo, ideal choice for lotions and conditioners for fine hair, thin/thinning hair, virgin-to-lightly damaged hair types that are sensitive to over-conditioning and build-up. Based on a vegetable-derived grade of isostearic acid, supplied in an anhydrous, inert solvent.	3.0-7.0	2.5-3.5	Fentacare® 1631 30 Or Mackine® 301
Clear liquid	Based on a pure grade of sunflower oil, supplied in an anhydrous, inert solvent. Can be used in a variety of personal care products to add lubricity and lessen static. Compatible with anionics, it can crossover from foaming to conditioning products, and is thus suitable for clear conditioning shampoos as well as leave-on conditioners and serums.	3.0-7.0	2.5-3.5	Fentacare® 1631 30 Or Mackine® 301
Waxy flake	Provides excellent conditioning and combability when formulated in all kinds of conditioning applications. Ideal for moderate to intensive care and a good alternative to quaternary surfactants as it has a spectrum very close to that of CTAC. Possibility to blend with CTAC / BTAC.	1.5-2.5	1.0-1.5	Fentacare® BTMS I 80 Or Fentacare® 1631 30
Waxy flake	High active, flaked form of Stearalkonium Chloride, it is easier to handle compared to the low active paste. Preservative-free, it is produced from a combination of synthetic and vegetable-derived raw materials and contains no animal derivatives.	2.0-3.0	1.0-2.0	Fentacare® 1631 30 Or Mackine® 301
White to yellow plaster	A standard quaternized sulfate-free surfactant, used in rinse-off conditioners and hair mask suitable for moderately damaged hair, thin/thinning hair, anti fly-away benefits.	3.0-4.0	1.5-3.0	Fentacare® BTMS I 80 Or Fentacare® 2231 MS
White to pale yellow pastilles or flakes	Quaternized, sulfated, superior & durable conditioning. 2231 MS is the pure version, BTMS 25EF is a version already blended with fatty OH. Excellent anti-static and conditioning agent. Yields premium quality cream rinses with superior wet and dry combing benefits. Fentacare® BTMS 25EF is also a mild and efficient emulsifying and structuring agent which is EDTA-free	3.0-4.0	1.5-3.0	Fentacare® 1631 30 Or Mackine® 301
White to light yellow solid		5.0-8.0	3.0-5.0	
White to yellow solid, waxy flakes	Excellent conditioner and detangling agent. Yields premium quality cream rinse conditioners that impart manageability to hair. Recommended for luxurious feel for normal to thick hair. Fentacare® 2231 EF is EDTA-free.	2.5-4.0	1.5-2.5	Fentacare® 1631 30 Or Mackine® 301
White to light yellow solid		2.5-4.5	1.5-2.5	

## Cationic Surfactants



Cationic surfactants come in a wide variety of structures which are key to fine tune both the texture and the performance of conditioners and masks. Their cationic heads go from quaternized (with superior affinity for damaged hair) to tertiary amidoamine (a quat-free technology with a non-persistent, pH-dependent cationic charge). Their counter ions vary in both size and type, from halides (generally chloride to multi-atoms (sulfated)).

Finally, the length of their alkyl chain can go from C16, C18 up to C22. This large variety of chemistries is captured by Solvay's comprehensive portfolio, with 9 different cationic technologies which allow formulators to cover over 90% of all conditioners launched on the market (Source: Mintel).

### Chloride Quats

Made of a long alkyl chain and a quaternized head group with a chloride or bromide counterion

### Sulfate Quats

Made of a long alkyl chain and a quaternized head group with a sulfated bulky counterion

### Tertiary Amines

Made of a long alkyl chain and a non-quaternized head group which becomes cationic at acidic pH

**50/50**

2015-2017

Proportion of conditioners in North America containing one cationic agent only, vs. mixtures of 2 or more cationic agents

The use of cationic surfactants of the 3 above types greatly vary in the industry. The use of either one alone is in fact not the majority habits among formulators, as only about one conditioner out of 2 launched in North America between 2013 and 2015, relied on only one cationic ingredient. Mixing 2 or more cationic ingredients is in fact a cost-efficient way to modulate performances: by relying on 2 or 3 core technologies, formulations can create different SKUs for different types of hair.

# Mackine® 301 Amido amine: quats replacement with lowest environment impact

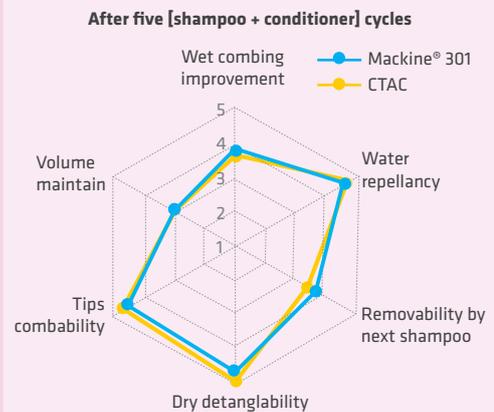
**Mackine® 301** is an amido amine that provides excellent conditioning and combability when formulated in all kinds of conditioning applications. Ideal for moderate to intensive care and a good alternative to quaternary surfactants as it has a spectrum very close to that of CTAC. Possibility to blend with CTAC/BTAC/BTMS.

## Key features

- Performance close to CTAC, intensive care, BUT with no impact on volume, good rinseability and no build up effect
- Very interesting, as non quaternized to address more sustainable conditioners trend (CTAC replacement or reduction, quats reduction)
- Flexible in term of formulation (conditioners, mask, cleansing conditioner)

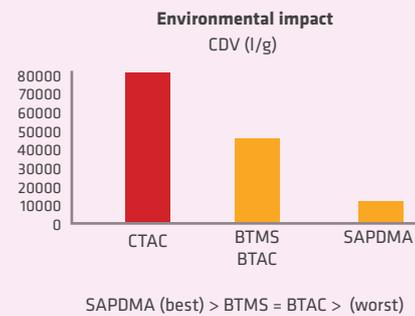
## Performance Spectrum

**Mackine® 301** has a performance spectrum very close to that of CTAC while being not quaternized. It provides intensive care with no impact on volume and a good removability.



## Environmental Impact

**Mackine 301**, being non quaternized, has a lowest environment impact compared to classical quats used in conditioners. Really perfect to formulate more sustainable conditioners



## Flexibility of use

**Mackine® 301** can be used in different types of finished products (conditioners, masks, cleansing conditioners)

### Cleansing Conditioner for Dry Damaged Hair

	Ingredients	% as is
A	Deioned Water	qs 100
	Mackine® 301 Stearamidopropyl Dimethylamine	1.0
	50% Citric Acid Solution	qs pH 4.0-4.5
	Fentacare® 2231 EF Behentrimonium Chloride	1.9
	Glycerin	0.5
B	Alkamuls® PSM 80C PEG-80 Sorbitan Laurate	4.2
	Cetearyl Alcohol (50/50)	5.0
C	Cetyl Alcohol	2.1
	Alkamuls® CRH/40 PEG-40 Hydrogenated Castor oil	0.2
	Preservative	qs
D	Preservative	qs

### Cupuçu Butter Mask for Dry Damaged Hair

	Ingredients	% as is
A	Deioned Water	qs 100
	Mackine® 301 Stearamidopropyl Dimethylamine	1.0
	50% Citric Acid Solution	qs pH 4.0-4.5
	Fentacare® 2231 EF Behentrimonium Chloride	3.9
	Glycerin	0.5
B	Cetearyl Alcohol (50/50)	3.8
	Stearyl Alcohol	2.6
	Cupuçu Butter	0.9
C	Mackester® EGDS Glycol Distearate	0.5
	Preservative	qs
	Amodimethicone	0.6
D	Fragrance	0.2

# Specialty Proteins

## Specialty proteins Born from natural oils, improved with technology

Proteins of different origins, wheat, rice or keratin, are modified thanks to proprietary processes, yielding potent molecules either cationic or cationic/hydrophobic. Used in skin and hair, specialty proteins provide smoothness, softness and can even repair damage.

Exposed to ultra-violet irradiation, harsh shampoos and to chemical coloring, perms or straighteners, hair fiber increases in damage and is in need of deep, targeted care. MackPro® Plus specialty proteins differ from the common hydrolyzed proteins and protein hydrolyzates. Functionalized with both cationic and hydrophobic anchors, these proteins can help hair or skin look and feel healthy again !

### Product selector

Type of cationic charge	Presence of hydrophobic moieties	Product Name	INCI	Physical form	Solids wt %	Properties
Quat	Yes	Mackpro® Plus RICE-C	Cocodimonium Hydroxypropyl Hydrolyzed Rice Protein	Liquid	19-22	Excellent wet and dry-comb properties, increased hair strength. Strengthens and moisturizes damaged hair. Improves hair body and shine.
Quat	Yes	Mackpro® KLP	Quaternium-79 Hydrolyzed Keratin Protein	Liquid	33.5-36.5	Highly substantive to hair and provides conditioning without an "oily" feel.

### Key features

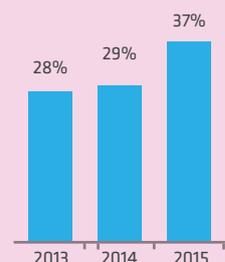
- Highly substantive to damaged hair & skin, they improve conditioning in both wet and dry states
- Improve flash foam and foam stability in a bodywash
- Provide better hair shine and softness
- Strengthen the hair fiber, ideal for damaged and weak hair
- Do not cause increase in eye irritation, at typical use levels
- Non-ecotoxic classification for all Mackpro® & Mackpro® Plus
- Compatible with anionics

### Potent Ingredients for Damaged Hair

Proteins are potent molecules which started appearing in the Hair Care market in the early 2000s. Over the years, they have slowly but surely made their way from the back of packaging, where ingredient lists sit, to the front: they now stand as a differentiating marketing argument that consumers clearly identify.

As the industry has consolidated its use of all proteins available, some, like Solvay's double-derivatized specialty proteins MackPro® - ie. both cationic and hydrophobic, have emerged as the most frequently used, in particular for damaged, colored, bleached, over-processed hair.

Growth in North America of the proportion of Hair Care products containing proteins AND claiming them on packaging (%) (source: Mintel)

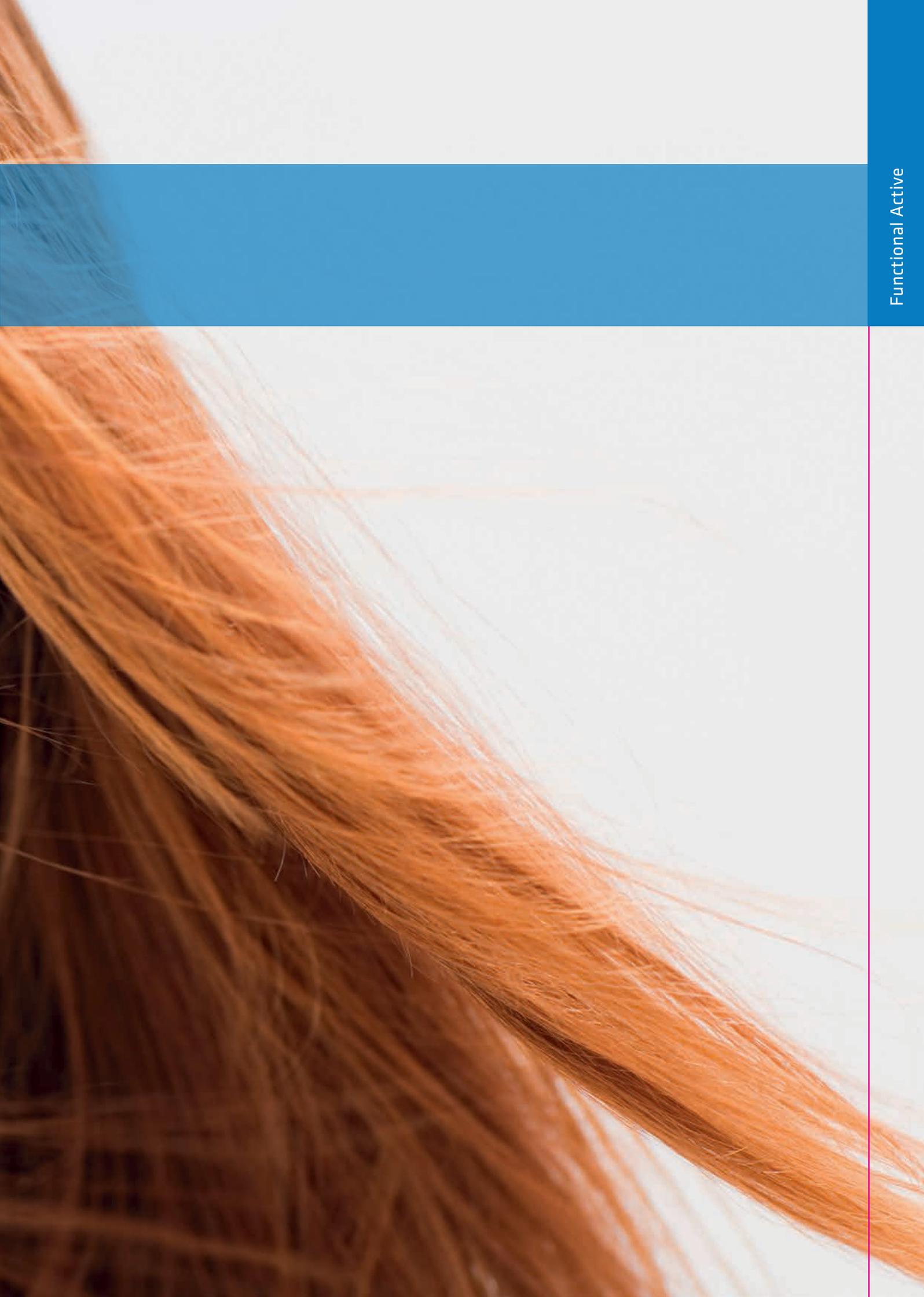


Marketing Corner

The place of proteins

# Functional Active





## Functional Active

## Natural & synthetic conditioning agents and deposition aids for hair and skin

### Silicone Alternative

Product Name	INCI	Active (%)	Form & Appearance	Properties & Applications
Mackaderm® LIA <b>2017 INNO</b>	Isoamyl Laurate	100	Liquid, Transparent, Light Yellow Color	It has a 100 % vegetable origin. Its silicone like sensorial profile and outstanding performance on dry state makes it suitable for hair care formulations. Moreover, it provides a light, non-greasy texture to the hair. Cosmos.
Polycare® Split Therapy <b>2017 INNO</b>	Hydroxypropyl Guar Hydroxypropyl-Trimonium Chloride	100	Natural (Powder)	A natural-based functional active developed to repair split ends. Non-ecotoxic.

### Repair Split ends

### Marketing corner

### Silicone alternative

Finding a silicone alternative is a key need in the hair care market today. Consumers looking for renewable solutions, as well as, a negative perception amongst some customers and hairdressers are driving the search for silicone alternative. But for some hair types, the silicones are essentials and very difficult to replace in term of efficacy and performance (combing, detangling, shine, softness, untied effect).

#### EMEA evolution and penetration of silicone-free in hair care formulations Launches 2013-2017



(Source: Mintel)

**Polycare® Split Therapy** is an innovative natural-based functional ingredient developed to repair split ends. Nothing beats a fresh haircut to make hair look shinier and healthier. But a few weeks of multiple mechanical, chemical and thermal treatments cause split ends that make hair unmanageable and lifeless. This new technology was optimized to deliver perceivable and durable repair of split ends from the first use, without compromising on sensory.

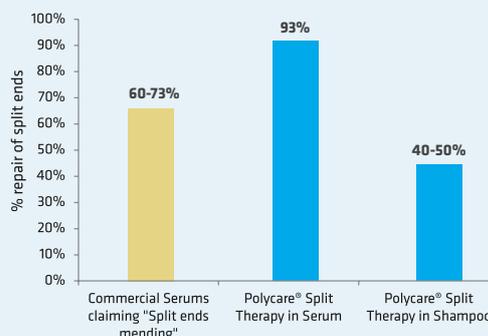
### Key features

- Natural-based and preservative-free
- Easy-to-process: Cold process & No premix needed
- Heals at least 90% split ends after 1 serum use
- No sensory drawbacks
- Long-lasting effect: Resists combing & washing
- Compatible and efficient in rinse-off formulations as well as leave-on

**INCI name:** Hydroxypropyl guar hydroxypropyl-Trimonium chloride

### Challenge to solution

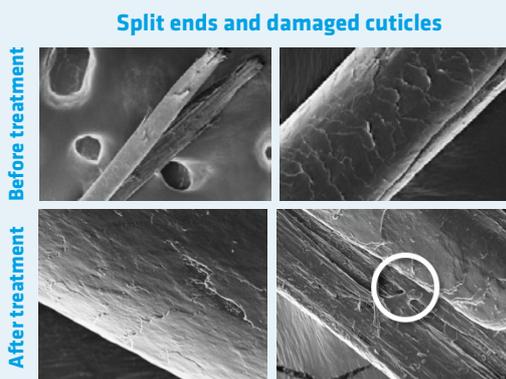
The split ends repair performance of the **Polycare® Split Therapy** outperform market benchmarks



*Solvay simplified serum (tested on 5 hair kits): water, 10% ethanol, 1% glycerin, 0.5% Polycare®, 0.5% panthenol, sodium benzoate  
Shampoo: 12/2 SLES/CAPB, 0.5% Polycare®, 1.2% NaCl*

### How does the Polycare® Split Therapy work?

Split ends are fully sealed and cuticles layed down after serum application. Some bridges appear between split ends parts. Hair ends diameter appears thicker, and looks healthier.



By Scanning Electron Microscopy

### Consumer benefits

The performance is stable after 10 neutral shampoo applications and resists quite well to 20 combings: most of the repair obtained after 1 serum application is retained. The reparation is durable across the time.



Washing & Combing performances: Laboratory Spin control results



# Rheological Solutions

Rheological  
Solutions





# Rheological Agents

## Natural & synthetic conditioning agents & deposition aids for wash-off and leave-on applications

Nonionic and anionic polymers, of natural or synthetic origins, have been designed and used for the purpose of helping control and fine-tune the rheology of Personal Care formulations, a feature essential to the Personal Care market in several aspects.

For formulators and manufacturers, the thickening and suspension polymers can provide, indeed ensure long-term stability to the products put on the shelves. For consumers, the texture before and during use, provides a memorable sensory experience which will favor product re-purchase.

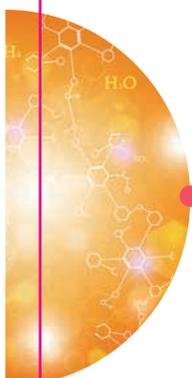
Rheological Solutions



	Product Name	INCI	Solids (%)	Preserv.	Properties
<b>100% Natural</b> Texture agents given by Nature	<b>Jaguar® S</b>	Cyamopsis Tetragonoloba (Guar) Gum	100% powder	Free	Powder 100% naturally derived thickening polymer, Jaguar® S develops viscosity. Validated by Ecocert. Compliant with Cosmos.
	<b>Rhodicare® T</b>	Xanthan Gum	100% powder	Free	High purity grade specifically designed for thickening and suspension in clear formulations. Validated by Ecocert. Compliant with Cosmos.
	<b>Rhodicare® XC</b>	Xanthan Gum	100% powder	Free	Similar to standard Xanthan Gum, this grade displays improved microbial specifications. Validated by Ecocert. Compliant with Cosmos.
	<b>Rheozan® SH</b>	Succinoglycan	100% powder	Free	Efficient thickener even at low dosage and low pH. Validated by Ecocert. Compliant with Cosmos.



<b>Natural derived</b> Inspired by Nature, modified with science	<b>Jaguar® HP-8 COS</b>	Hydroxypropyl Guar	100% powder	Free	Optimum thickening effect. Compatible with diluted alcohol solutions up to 30% ethanol. Good compatibility with electrolytes and stability over a wide range of pH. Smooth skin feel. Helps stabilize emulsions.
	<b>Jaguar® HP-105</b>	Hydroxypropyl Guar	100% powder	Free	Highest thickening capability and optimum compatibility with polar solvents among guar gum derivatives. Fully compatible with 100% ethanol-based formulations. Stable over wide pH range.
	<b>Jaguar® HP-120</b>	Hydroxypropyl Guar	100% powder	Free	



<b>Synthetic</b> HASE copolymers for rinse-offs and leave on skin care	<b>Alkamuls® S 6000</b>	PEG 150 Distearate	100% Flakes	Free	Efficient rheology modifier providing structure to your system containing high surfactant content.
	<b>Rheomer® 33T</b>	Polyacrylate-33	Milky liquid	Free	Rheological polymer specifically designed to provide a high thickening efficiency, suspension properties and high clarity in surfactant systems with low to medium active levels (6-13% surfactant).
	<b>Rheomer® AB 25 T</b>	Acrylates/ Beheneth-25 Methacrylate Copolymer	Milky liquid	Free	China ready version of Rheomer® 33T.
	<b>Rheomer® SC-Plus</b>	Acrylates/ Beheneth-25 Methacrylate Copolymer	Milky liquid	Free	Rheology modifier for o/w emulsions and "emulsifier-free" formulations for skin care, body care, sun care and color cosmetics. Excellent stabilizer for systems containing salts/electrolytes and particulates like color pigments and titanium dioxide.

# Jaguar® HP105 & Rhodicare® T

## A naturally derived rheology control thickening & stabilizing for cleansing formulations

The association of these two rheology modifiers in surfactant systems, **Jaguar® HP 105 & Rhodicare® T**, improves the texture of xanthan gum used alone and has a very good response in mild transparent formulations. It delivers a soft and smooth skin feel, easily to rinse.

### The Jaguar® HP 105

- Thickening Properties
- Moderate Shear-thinning rheology
- Excellent clarity
- Shear Thinning: no yield stress = no particle in suspension
- Smooth skin feel, film forming properties
- Renewable Carbon Index (RCI): 63%

**INCI name:** Hydroxypropyl Guar



### The Rhodicare® T

- High Shear-thinning rheology
- High yield stress = strong ability to suspend
- Good clarity
- Thickening Properties
- Renewable Carbon Index (RCI): 100%

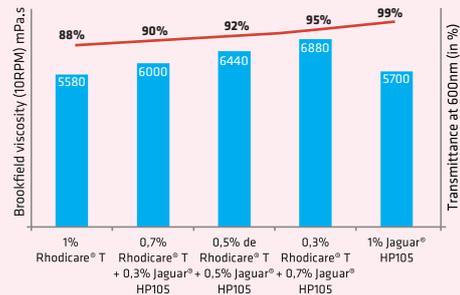
**INCI name:** Xanthan Gum

The synergy between **Jaguar® HP 105 & Rhodicare® T** provides natural solutions:

- Brings a unique skin feel on the skin
- An optimal sensorial experience and it is easily to suspend particles or actives
- A high viscosity
- A good synergy for the foam volume and stability of the foam

Challenges to solution

A good synergy for optimal **transparency** and **texture**

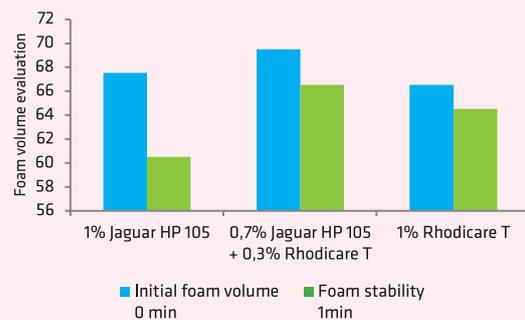


Ratio Rhodicare® T/Jaguar® HP105  
1% Active polymer



Consumer benefits

A good synergy for optimal **sensorial experience**



SLES/CAPB: 10/2, 0% NaCl  
High throughput Ross-Miles device 10% dilution  
shower gel, 30°TH

# Rheomer® AB 25T

## Innovative rheological agent designed for personal cleansing solutions with low surfactant content

Personal cleansing formulations have become more and more sophisticated over time. **Rheomer® AB 25T** is a new hydrophobically-modified alkali-swellable emulsion (HASE) polymer for personal cleansing formulations. It is designed to provide efficient thickening & good suspension properties in low-to-medium surfactant systems. It is China compliant.

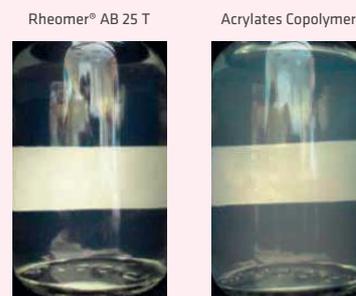
### Key features

- High thickening efficiency in both sulfate-based and sulfate-free surfactant systems
- Good suspension properties in low-to-medium surfactant systems, typically 6–13 wt % active surfactants
- Superior clarity for pH > 6.3, with a high tolerance to salt
- Enhanced flash-foam & foam volume; high foam richness, whiteness & elasticity
- Pleasant cushiony in-use feel and clean-rinse properties
- Easy-to-use liquid form: suitable for cold process
- Good compatibility with cationic polymers

**INCI name:** Acrylates/Beheneth-25 Methacrylate Copolymer

High viscosity & clarity

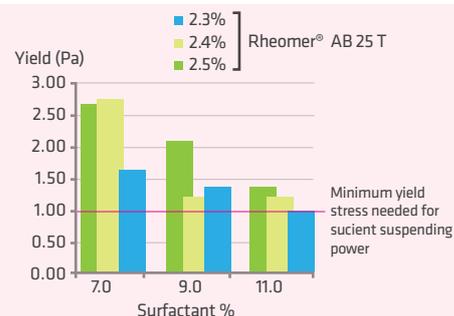
**Rheomer® AB 25 T** allows for a significant reduction of thickener inclusion level in cleansing formulations. **Rheomer® AB 25 T** displays synergistic thickening and high clarity in the presence of salt.



In a 9 / 2 wt% active SLES /CAPB surfactant basis, pH 6.5 – 2.0 wt% active polymer

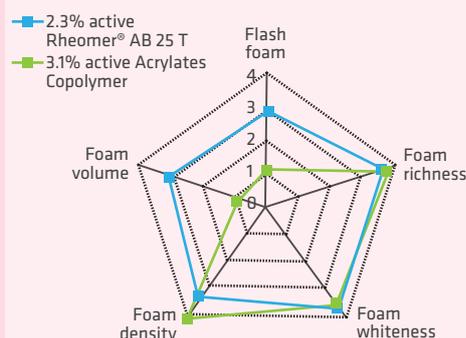
Tunable suspension

While a yield stress > 1 Pa is typically sufficient to suspend most particles, **Rheomer® AB 25 T** provides superior suspension in economical formulations based on low surfactant contents.



Rich, creamy & smooth foam

Designed to bring a good balance between yield stress, thickening and easy dilution under the shower, **Rheomer® AB 25 T** also provides enhanced foam properties.





Rheozan® SH

## Natural rheology polymer for smooth & velvety skin feel



**Rheozan® SH** is a hydrocolloid rheology modifier that is validated natural by Ecocert and COSMOS certified. It is produced by pure fermentation, purified upon recovery and powdered for easy handling and processing. It provides a smooth and velvet after-feel to skin care formulations and helps eliminate tackiness.

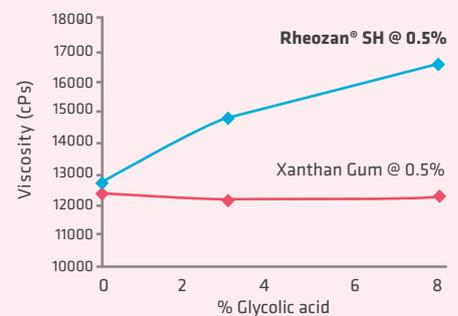
### Key features

- Smooth, velvet skin feel
- Eliminates tackiness
- Excellent stabilizer for systems containing acidic actives, salts/electrolytes
- Wide pH range compatibility (<3 to >12)
- Hot- & cold-processable
- Suitable for skin & sun care formulations with salts/electrolytes or electrolyte-containing actives and skin & sun care formulations containing acidic active ingredients
- Adequate for natural, "Masstige" to prestige skin care formulations where excellent skin feel is a key consideration
- Recommended dosage level: 0.2-1% as supplied

**INCI name:** Succinoglycan

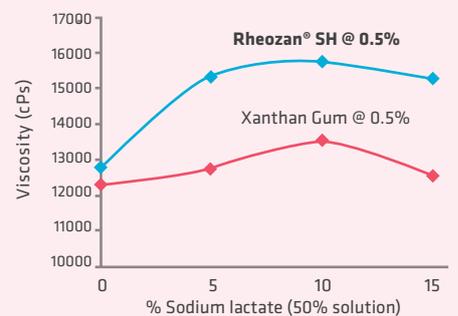
Efficient in presence of acidic actives

**A biopolymer which suspends and also thickens.**  
**Rheozan® SH** exhibits excellent thickening and stabilizing properties in the presence of acidic actives.



Efficient in presence of electrolytes

**A biopolymer with excellent tolerance to acidic actives.**  
**Rheozan® SH** exhibits excellent thickening and stabilizing properties in the presence of electrolytes.



**Rheomer® SC-Plus** is a rheology modifier designed for oil-in-water emulsions to meet current formulation trends for sophisticated, multi-benefit skin and sun care products. It consists in a hydrophobically-modified alkali-swellable emulsion polymer, with a pH in use higher or equal to 6.5 for optimally stable “neutral-pH” formulations.

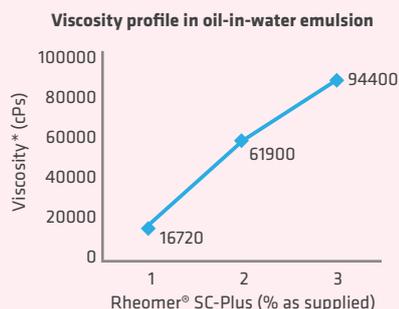
### Key features

- Smooth, non-sticky feel after dry down
- Provides robust stability to oil-in-water emulsions
- Allows the formulation of stable “emulsifier-free” systems
- Excellent suspension ability
- Stabilizes electrolyte-containing oil-in-water formulations
- Cold processable, easy-to-use liquid
- Recommended use level: 1-6% as supplied
- Preservative-free
- Good Performance for SPF formulas

**INCI name:** Acrylates/Beheneth-25 Methacrylate Copolymer

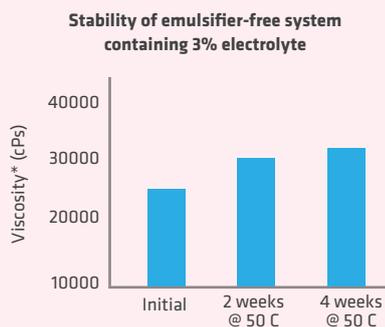
Efficient  
viscosity  
building

**Rheomer® SC-Plus** exhibits **robust viscosity** building properties in oil-in-water emulsions.



Electrolyte  
tolerance &  
stability

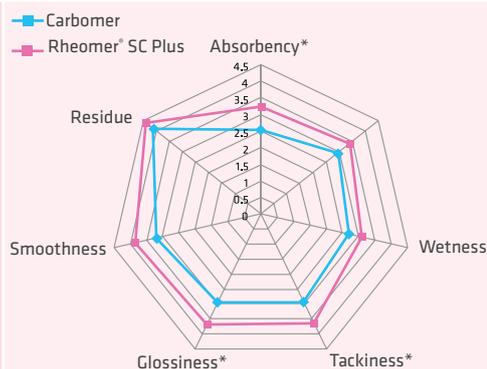
**Rheomer® SC-Plus** provides **best-in-class electrolyte tolerance**. Additionally, it exhibits **excellent stabilization** even in emulsifier-free systems.



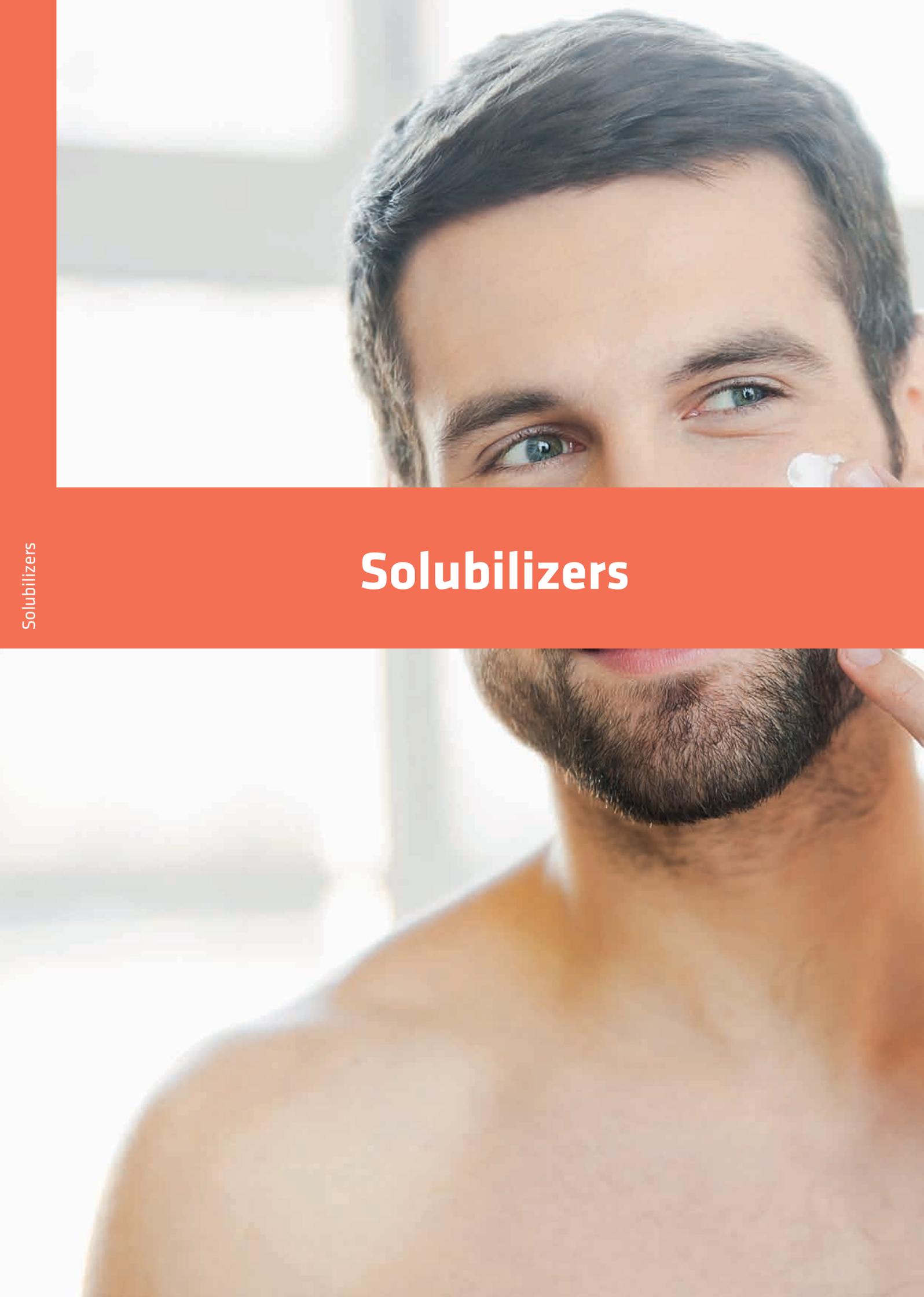
Sensory  
Evaluation

**Rheomer® SC-Plus** formulation absorbs faster.

**Rheomer® SC-Plus** formulation is less tacky and more glossy.



\*Significant difference at 95% confidence level



# Solubilizers



# Solubilizers

## Product selector

Product Name	INCI	Physical form	Source	HLB	Properties & applications
Alkamuls® PSML-20PC	Polysorbate-20	Liquid	Fatty acids	16,7	Effective solubiliser for oils and perfumes in water and water-alcohol systems. It is also used as an emulsifier in o/w formulations usually in combination with Sorbitan Monolaurate as co-emulsifier. It can also be used as a mild cleansing agent in wipes & make-up removers. Usage levels: 0.5-5%.
Alkamuls® PSMS-20PC	Polysorbate-60	Paste		14,9	Widely used as an o/w emulsifier, especially when combined with Sorbitan Monostearate and/or fatty alcohols. Recommended for use in skin care, sun care, hair care, colour cosmetics and baby care. Usage levels: 0.5-5%.
Alkamuls® PSMO-20PC	Polysorbate-80	Liquid		15,0	Used often as an o/w emulsifier in conjunction with sorbitan monooleate or other low HLB emulsifiers. Also an excellent solubiliser, particularly for unsaturated lipid materials like vegetable oils. Usage levels: 0.5-5%.
Alkamuls® PSML-80PC	PEG-80 Sorbitan Laurate	Liquid		19,1	Surfactant for ultra-mild products such as baby shampoos/ body wash. Solubiliser and cleansing agent. Mild, non-irritating to the eyes.
Alkamuls® PSML-80/72LD					
Alkamuls® GC-7	PEG-7 Glyceryl Cocoate	Liquid	Triglycerides	10,6	Hydrophilic emollient and superfatting agent, mildness additive and solubiliser in surfactant systems (shampoos, shower and bath preparations, etc.) as well as in aqueous and hydro-alcoholic systems and skin care emulsions. Helps give a dense, creamy foam in surfactant systems and leaves a pleasant skin feel. Decreases irritation potential of surfactants. Usage levels: 2-10%.
Alkamuls® CR-H40PC	PEG-40 Hydrogenated Castor Oil	Liquid		13,0	Universal solubilisers for essential oils, perfumes, and lipophilic actives. Impart superfatting benefits in detergent systems. Used as wetting agents in styling waxes. Suitable for use in skin creams and lotions, sun care, hair care, bath and shower products and wipes. Usage levels: 0.5-10%.
Alkamuls® CR-H60PC	PEG-60 Hydrogenated Castor Oil	Liquid		14,7	
Alkamuls® PEG-16 CO	PEG-18 Castor Oil Dioleate	Liquid		-	A powerful solubilizer for the solubilization of natural oil in cleansing formulations. Versatile, shows improved solubilization efficiency in comparison to conventional PEG Hydrogenated Castor oils.

2017  
INNO

**Alkamuls® PEG-16 CO** is a unique, versatile co-solubilizer for natural oils. Without compromising on clarity, stability, viscosity, foam and cleansing performance, formulators can create clear cleansing formulas infused with natural oils, at an efficient level (typically >0.9%), to deliver their powerful caring benefits to hair & skin. In combination with the cleansing surfactant chassis, the **Alkamuls® PEG-16 CO** is efficient by itself, to avoid solubilisers cocktails that formulators usually have to resort to.

### Key features

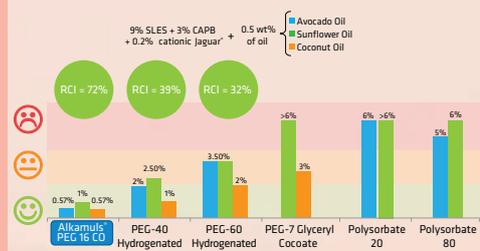
- Nurture your dry skin/ hair with natural oils
- Maintains full transparency, conveying purity and lightness
- Delivers softness & shine on hair without any cleanliness issues or greasiness
- Produces better spreadability

**INCI name:** PEG-18 Castor Oil Dioleate (China compliant)

New  
Solubiliser

**Alkamuls® PEG-16 CO** is equally efficient at solubilizing different vegetable oils (**Avocado, Sunflower and Coconut**), regardless of their chemical features: saturated or not, lauric, oleic or linoleic. **Alkamuls® PEG 16 CO** does not perform the market benchmarks solubilisers commonly used in this new trend. And on top of the clarity it has positive impact on foam richness and softness (dry stage) used in this new trend.

**Alkamuls® PEG 16 CO**  
Amount of solubilizer to obtain a crystal clear oil-infused formulations (i.e. T% ≥ 94%)



Challenges  
to solution

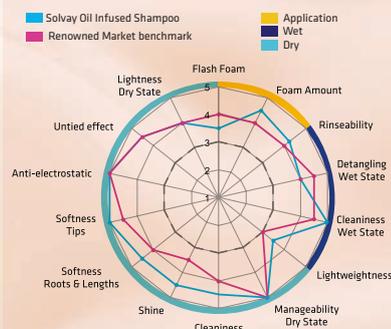
- 1** Solve formulation challenges caused by increasing oil levels from 0.1 to 1.0% (tough to thicken, poor flash foam)
- 2** Delivering perceivable skin/ hair sensory benefits without negatives (weigh hair down, oily skin feel)
- 3** Maintain full transparency, to surprise consumer's senses by conveying both purity, lightness yet high care

### OIL INFUSED = A WINNING SILICONE ALTERNATIVE

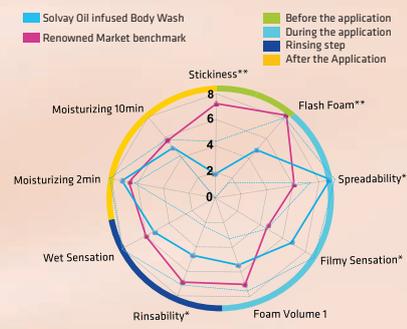
- Our new solubiliser Alkamuls® PEG 16 CO
- Can be used in synergy with our cationic Jaguar® range, which provides care benefits for dry hair & skin
- Works effectively on different hair types

Consumers  
benefits

### Sensory evaluation / Half head testing



### Sensory evaluation / Trained panel



\*significance 5% \*\*significance 1%

- Transparent and delivers softness & shine
- Effective on different types of hair, eg. Caucasian and Brazilian
- Lightness equivalent to the benchmark without silicone
- Other performance attributes similar to the benchmark

- Moisturizing equivalent
- Better spreadability, filmy sensation and less stickiness
- Work in progress on the foam criteria

# Emulsifiers, Emollients, Humectants





Emollients,  
Humectants,  
Emulsifiers

# Emulsifiers

## ETHOXYLATED Product selector

Product Name	INCI	Physical form	Source	HLB	Properties & applications
Alkamuls® AL-CS20	Ceteareth-20	Pastilles	Fatty alcohols	15,7	Universal emulsifiers/co-emulsifiers for cosmetic and pharmaceutical O/W creams and lotions, hair conditioners & treatments. Stable at elevated temperatures, good freeze/thaw stability. Compatible with all kinds of cosmetic oils and active ingredients. Also used as bodying agent for creams and lotions.
Alkamuls® AL-CS25	Ceteareth-25	Pastilles		16,2	
Alkamuls® AL-S2	Steareth-2	Pastilles		4,9	Emulsifiers / co-emulsifiers, commonly used in combination with each other. Excellent salt tolerance. Bodying agent for creams and lotions. Suitable for use in skin care, baby care, anti-perspirants/deodorants and other formulations with high salt levels.
Alkamuls® AL-S20	Steareth-20	Pastilles		15,3	
Alkamuls® BN	Cetearyl Alcohol and Ceteareth-20	Pastilles		15,5	
Alkamuls® AC-S40	PEG-40 Stearate	Pastilles	Fatty acids	16,7	Oil-in-water emulsifiers, wetting agents and dispersants. Suitable for use in skin care, hair styling, sun care and colour cosmetics. Alkamuls AC-S40 is excellent for formulating low viscosity o/w emulsions, e.g. milks and sprayables.
Alkamuls® AC-S100	PEG-100 Stearate	Pastilles		18,8	
Alkamuls® GS-100	Glyceryl Stearate and PEG-100 Stearate	Pastilles		11,0	Widely used emulsifying wax for formulating o/w emulsions. It can be used as the sole emulsifier for mildly acidic O/W creams and lotions, as well as electrolyte containing emulsion products.
Alkamuls® SE 55	Cetearyl Isononanoate (and) Ceteareth-20 (and) Cetearyl Alcohol (and) Glyceryl Stearate (and) Glycerin (and) Ceteareth-12 (and) Cetyl Palmitate	Liquid	Fatty alcohols and acids	n.d	Complete emulsifying complex based on phase inversion technology, that readily produces o/w emulsions by cold process with excellent stability, even at low viscosities required for wipes applications & sprayable emulsions

**NON-ETHOXYLATED  
Product selector**

Product Name	INCI	Physical form	Source	HLB	Properties & applications
Mackester™ PGPR	Polyglyceryl-3 Polyricinoleate	Liquid	Fatty acids	4	A non-ionic emulsifier for w/o systems. It is also used as a co-emulsifier in o/w systems. It is an excellent wetting agent for pigments and other particulate materials in formulations like colour cosmetics, sunscreens.
Mackester™ PGDS-LW	Polyglyceryl-3 Di-Isostearate	Liquid		10.7	O/W emulsifier. 100% vegetable origin. Works as an emulsifier and/or as an emollient. Mainly used in lip gloss, lipstick, sunscreens, auto-bronzers, moisturizers and anti-ageing serums.
Mackester™ PG38	Polyglyceryl-3 Caprylate	Liquid		n.d.	Works very well as a co-emulsifier and/or emollient . Suitable for use in skin care, sun care and deodorant application.
Mackester™ DIEG	Glyceryl Diisostearate	Paste		n.d.	O/W Emulsifier. Excellent dispersing properties for pigments. Used in skin care, sun care, lipsticks and make up.

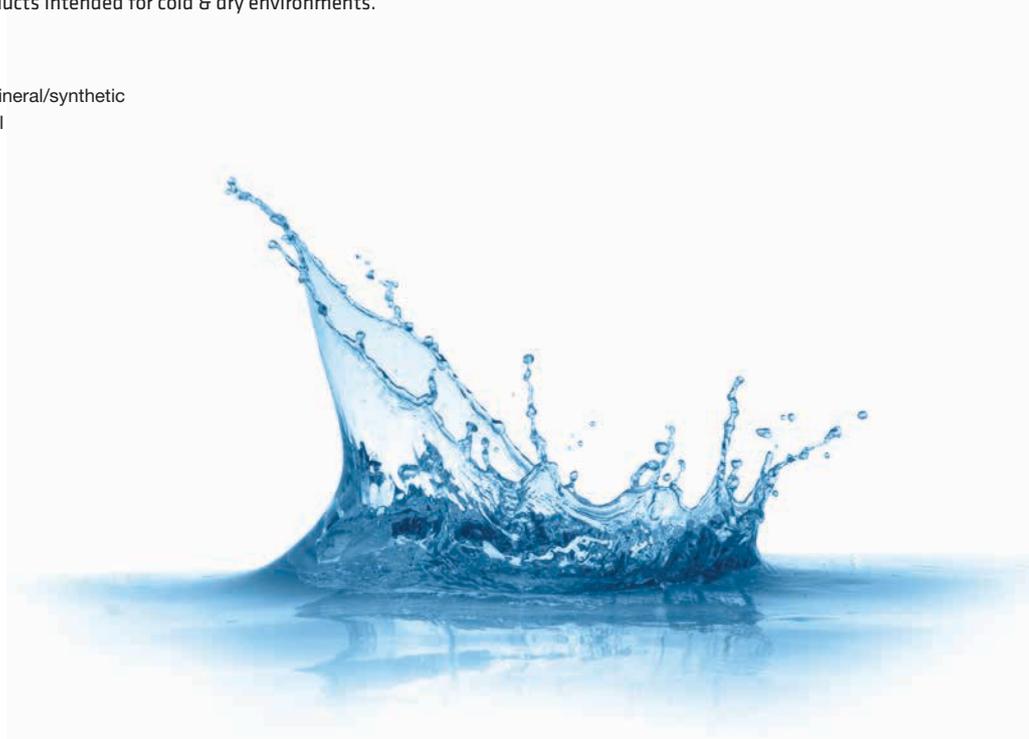
Sensory Properties are evaluated by sensory evaluators using the neat emollients.

**Skin Play:** refers to the ease and duration of application, i.e. “massagability”. High (H) skin play means the material is very easy to spread and stays long on the skin surface. They facilitate spreading of emulsions and even coverage, making them ideal for foundations, body moisturizers and sun care products. Emollients with low (L) skin play either absorbs very fast or are difficult to spread.

**Tack:** refers to the degree of the stickiness of the emollient. Low (L) tack emollients are essentially non-sticky while high (H) tack emollients demonstrate highly perceivable stickiness.

**Emollients:** the degree of being able to soothe, smooth and provide protection or relief from skin roughness. Materials with low emolliency are suitable for light formulations intended for tropical humid climates, for example. High emolliency materials are more suitable for highly protective moisturizers and products intended for cold & dry environments.

-  : Vegetable
-  : Vegetable and mineral/synthetic
- S : Synthetic/Mineral
- n.d. : not determined



# Emollients Esters

Emollients are key ingredients of skin and hair care products. They provide a protective barrier which contributes to moisturizing, softening and smoothing of the skin. Emollients impart gloss and softness to hair from styling, leave-on and rinse-off conditioning formulations. Emollients also contribute to the in-use sensory properties of formulated products. By carefully choosing emollients, formulators are able to design products that provide unique after-feel sensory properties.

Mackaderm® emollients are a range of specialty esters can help formulators meet increasingly stringent consumer requirements for sustainability, multi-functionality, efficacy and unique sensory experience from cosmetic products.

Product selector					Sensory Properties		
Product Name	INCI	Physical form	Source	Properties & applications	Skin Play	Tack	Emollients
Mackaderm® A99-LW*	Isononyl Isononanoate	Liquid	S	Liquid lipophilic emollient. Antistatic agent. Widely used in transparent gloss. Suitable for aerosols and wipes. Plasticizer for resins in Hair Sprays (reduces gel-like formation on pumps). Binder for processed powders.	H	L	L
Mackaderm® AD203*	Di-Isopropyl Adipate	Liquid	S	Liquid lipophilic emollient. Good solvent for Sunscreens actives. Compatible with alcoholic systems. Film Forming benefits (after shave application).	H	L	M
Mackaderm® AD208*	Di-Ethylhexyl Adipate	Liquid	S	Liquid lipophilic emollient. Skin lubricant offering smoothness and softness. Suitable for roll-on applications, lipsticks. Offers film forming and skin conditioning.	H	L	M
Mackaderm® DCC*	Dicaprylyl Carbonate	Liquid		Liquid lipophilic emollient. Fast spreading emollient with a dry touch. Compatible with sunfilters. Good co-solvent for fragrance.	M	L	M
Mackaderm® LIA <i>Silicone Alternative</i> <b>NEW 2018</b>	Isoamyl Laurate	Liquid		Liquid lipophilic emollient. 100% vegetable derived. Vegetable alternative to Isopropyl Palmitate and C12-C15 Alkyl Benzoate. Low viscosity emollient. Good sunscreen solvent/dispersant, especially in high SPF formulations. Good pigment dispersing properties color cosmetics. Perceivable sensorial benefits due to Isoamyl chemistry.	H	L	L
Mackaderm® PET8*	Pentaerythryl Tetracaprylate/ Tetracaprate	Liquid	S	Liquid lipophilic emollient. High molecular weight emollient, Branched chain ester that confers a long-lasting and lubricious skin feel. Cushion effect on the skin surface. Suitable for massage products and hair conditioning and to improve combing.	L	M	M
Mackaderm® V920*	Bis-Diglyceryl Polyacyladipate-2	Semi-solid	S	Waxy lipophilic emollient. 100% vegetable origin. Natural Lanolin direct substitute. Matches Lanolin characteristics: melting point, color, odor, neutral taste, pasty, sticky and hydrophilic properties. Good gloss improver.	n.d.	n.d.	n.d.
Mackaderm® Cocoa* <b>NEW 2018</b>	Myristyl Oleate, Myristyl Palmitate, Myristyl Stearate	Solid		Specialty Esters. 100% vegetable origin. Ester of Cocoa Butter via ENZYMATIC process. Viscosity controlling agent. Mainly used in Body Care, Hair Care, Sun Protection and Make-up.	n.d.	n.d.	n.d.

Product selector					Sensory Properties		
Product Name	INCI	Physical form	Source	Properties & applications	Skin Play	Tack	Emollients
Mackaderm® AR33	Glyceryl Triacetyl Hydroxystearate	Liquid		Liquid lipophilic emollient and texture modifier. It is a saturated ester, from vegetable (80%) and synthetic sources, highly resistant to oxidation. Its film forming sensorial profile and very good performance on dry state makes it suitable for silicone-free hair care formulations.	n.d.	n.d.	n.d.
Mackaderm® DE	Dicaprylyl ether	Liquid		Liquid lipophilic emollient. Dry touch and excellent spreadability. Suitable for creams and lotions with body, hand and facial applications, make up remover and deodorants	n.d.	n.d.	n.d.
Mackaderm® AD2N4	Dibutyl Adipate	Liquid	S	Liquid Lipophilic Emollient. Dry touch and good spreadability. Used for face care products, sunscreen, deodorants, after shave and lipsticks.	n.d.	n.d.	n.d.
Mackaderm® IPMD	Diisopropyl Dimer Dilinoleate	Liquid		Liquid Lipophilic Emollient. High viscosity emollient. Excellent film former that is used specially in make up products	n.d.	n.d.	n.d.
Mackaderm® IPIS	Isopropyl Isostearate	Liquid	S	Liquid Lipophilic Emollient. Low viscosity. High spreadability. Used in creams, lotions and sunscreen.	n.d.	n.d.	n.d.

 : Vegetable  
 : Vegetable and mineral/synthetic  
 S : Synthetic/Mineral  
 n.d. : not determined

# Humectants

## Product selector

Product Name	INCI	Physical form	Active (wt%)	Preserv.	Properties & applications
Mackamide® LAME-100	Acetamide MEA, Lactamide MEA	Clear liquid	100	Free	Superior humectant blend for use in hair and skin care formulations. Provides a pleasant, soft, conditioning feel, and a proven synergistic performance with Glycerin.

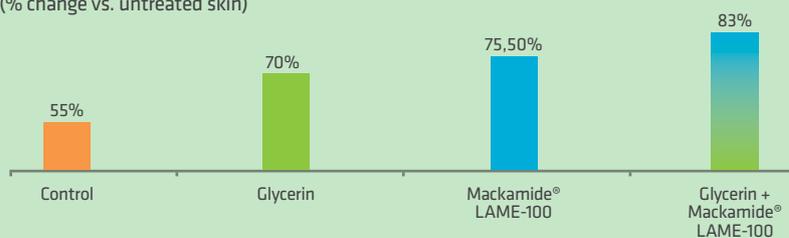
Product focus

Mackamide® LAME

### Skin & hair humectant boosters

Humectants are hygroscopic substances which absorb moisture from the atmosphere. By forming thin films over keratinous surfaces, they slow down the loss of water. Glycerin is commonly used as additive used to provide such benefit in personal care formulations, like shampoos, conditioners, bodywash, hand soaps, creams and lotions. But the tacky feel it also brings, can sometimes be an issue, a problem which often limits the level of glycerin in formulations and which can be overcome thanks to specialty alkanolamides. In addition, Mackamides® all provide humectancy comparable to glycerin by themselves, Mackamide® LAME also shows a notable synergy with glycerin.

Moisturization after 2 hours  
(% change vs. untreated skin)





Emollients,  
Humectants,  
Emulsifiers

# Anionic Surfactants





# Anionic Surfactants

Alkyl and alkoxyated sulfates have been the market standard for over 30 years as foaming agents in personal care formulations. These molecules come in different versions: ethoxylated or not, with different counterions, based on alkyl chains of various length, origin and structure.

The ethoxylated portion (or “EO”) in the alkoxyated version of sulfates, helps in mitigating the irritancy of these very efficient cleansing agents: it is well accepted, and verified experimentally, that the larger the number of EOs in the molecule, the better the mildness.

Product selector								
Origin of raw materials	Preserv.	Solids (%)	EO	Product name	INCI	Active Content (wt%)	Physical form	Special features
Natural	Free	High	Free	Mackol® CAS 100N	Sodium Coco-Sulfate	90-100	Needles	Dioxane-free Cosmos, Ecocert
		High	3	Rhodapex® EST 65	Sodium Trideceth Sulfate	62-65	Paste-Like Fluid	-
		Av.	Free	Rhodapon® LX 28 HA	Sodium Lauryl Sulfate	27-29	Liquid	Dioxane-free
			2	Rhodapex® ESB 70 NAT	Sodium Laureth Sulfate	68-72	Paste	100% renewable carbon
		Av.	2	Rhodapex® ESB 30 HA1	Sodium Laureth Sulfate	30	Liquid	Preserved at high pH

# Rhodapex® ESB-70 NAT

## Vegetable origin Sodium laureth sulfate for eco-friendly personal cleansing formulations

Rhodapex® ESB-70 NAT is a 2-EO Sodium laureth sulfate (SLES) that is made from 100% renewable carbon. Absolutely no carbon from petrochemical origin is used in its production.

### Key features

#### Bio-sourced SLES with 100% Renewable Carbon

- 100% renewable carbon
  - Ethylene oxide made from sugar cane
  - Lauryl alcohol derived from palm kernel oil
- 30% reduction in greenhouse gas emissions compared to conventional SLES
- High actives content limiting volumes shipped and stored
- Preservative-free, certified 100% natural by Ecocert

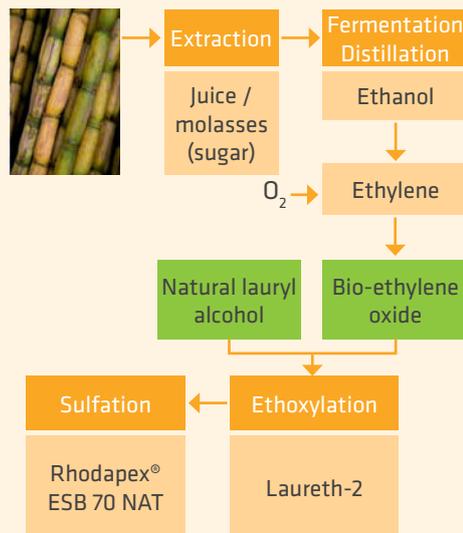
**INCI name:** Sodium Laureth Sulfate

Excellent sustainability profile

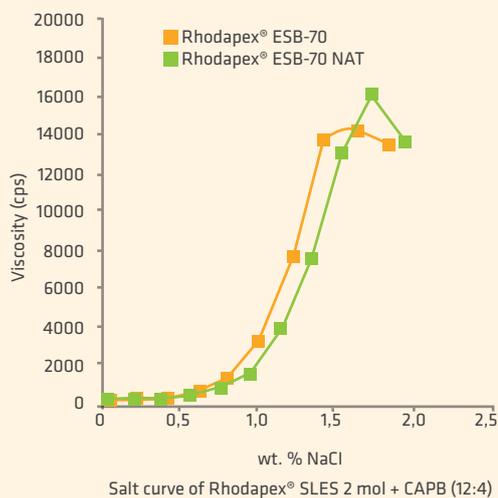
Uncompromised performance

#### The ability to source natural “BIO - EO” is the key to making 100% renewable carbon SLES.

To improve the sustainability profile of sodium laureth sulfate, Solvay has designed Rhodapex® ESB-70 NAT, based on ethylene oxide derived from sugar cane and lauryl alcohol from palm kernel oil.



Rhodapex® ESB-70 NAT performs just like conventional SLES. Solvay studies show that it can replace conventional SLES in your formulations with no hassle.



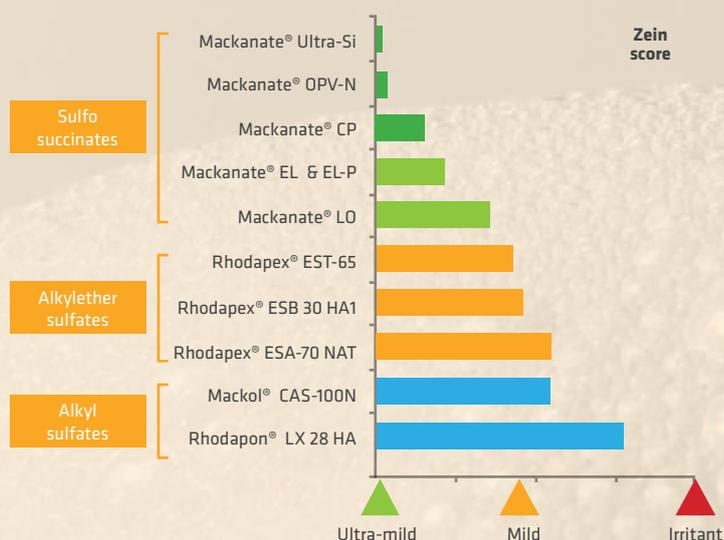
## Mild Specialty Anionics

Non-sulfated anionics keep gaining momentum on the market. The concern for irritation is growing among consumers as their awareness that milder solutions can be formulated grows. From 2013 to 2015, the fraction of cleansing formulations (ie. shampoo, bodywash, liquid soap) based on sulfated anionics launched in North America, has dropped from 71 to 56%. Meanwhile those based on non-sulfated anionics rose from 10 to 22% (source: Mintel).

Mildness and foaming, however, can go in opposite directions : the key feature that makes surfactants less irritating (i.e. higher surface tensions) also makes them yield less foam. Whereas, foam is essential to the consumer's experience and influences their loyalty to a brand.

For these reasons, Solvay's wide portfolio of non-sulfated options, our formulators are keen on investigating both mildness & foaming in parallel; to make sure formulations more respectful of skin and hair, are not obtained at the expense of the consumer's sensorial experience.

- A great variety of polar heads chemistries: sulfonates, isethionates, sulfosuccinates, taurates, glycines, carboxylates and phosphates
- Tunable foams, from airy (sulfonates) to shaving cream (isethionate) and skin & hair feel, from squeaky clean (sulfonates) to soap-like (glycines).
- Significantly improvement of mildness, in particular specialty sulfosuccinates (cf. graph) and phosphate esters.



### Science corner

#### Mildness tests

#### Tests used in the industry to rank surfactants with respect to their mildness

In vitro as well as in vivo tests are routinely used:

- **Zein in vitro test:** a test based on protein denaturation by a 1 wt% active surfactant solution. The less denaturated, the milder. Solvay uses the test as a screening tool for stand-alone surfactants and mixtures.
- **EpiOcular® Eye Irritation in vitro test:** an alternative to animal testing, the method measures the cytotoxicity (MTT dye conversion) to the EpiOcular tissue construct after exposure to a product.
- **HRIPT in vivo test:** the Human Repeat Insult Patch Test consists in applying a product to the skin 9 times over 3 weeks, followed by a two-week rest period after which the skin is exposed again.

# Sulfosuccinates & Sulfonates

Sulfosuccinate selector							
Presence of EOs	Specialty function	Product name	INCI	Actives (wt%)	Physical form	Preserv.	Properties
Yes	-	Mackanate® EL-P	Disodium Laureth Sulfosuccinate	30-34	Clear liquid	Various systems: DMDM hydantoin or MIT/MCIT or Phenoxyethanol	Very mild to the skin, these highly foaming surfactants can be used as a anionic secondary to sulfates to improve mildness, or as the main anionic in sulfate-free cleansing formulations.
	Silicone moiety	Mackanate® ULTRA SI	Disodium PEG-12 Dimethicone Sulfosuccinate	36-41	Clear liquid	Free	A unique, exceptionally mild silicone specialty, ideal for personal cleansers with extremely low eye and skin irritation potential. Suitable for "no rinse" formulations.
No	-	Mackanate® LO	Disodium Lauryl Sulfosuccinate	38-42	Paste	DMDM hydantoin, Methyl-paraben	Suitable for skin and hair cleansers. Produce a very tight, dense foam and leave skin with a pleasant after-feel. Mackanate® LO-100 is spray dried, recommended for solid products such as syndet bars.
		Mackanate® LO-100	Disodium Lauryl Sulfosuccinate	95-100	Powder	DMDM hydantoin, Methyl-paraben	
	Alkanol amide moieties	Mackanate® OPV-N	Disodium oleamido MIPA Sulfosuccinate	> 25	Clear liquid	MIT	Extremely mild to both skin and eyes, these specialty sulfosuccinates can help improve the mildness of formulations based on alpha olefin sulfonates or alkyl/alkyl ether sulfates, without significantly reducing foam. They also responds readily to viscosity builders such as alkanolamides, amphoteric and salts. Finally, they can contribute to sensory benefits, leaving a pleasant silky after-feel.
		Mackanate® RM	Disodium Ricinoleamido MEA Sulfosuccinate	> 39	Clear liquid	DMDM hydantoin, Methyl-paraben	

Sulfonate selector							
от EUS	αικυι	Product name	INCI	Solids (wt%)	Physical form	Preserv.	Properties
No	Synthetic	Rhodacal® LSS-40/AX	Sodium C14-16 Olefin Sulfonate	38-42	Liquid	MIT/MCIT	Sodium C14-16 Olefin Sulfonate is a very high foaming surfactant used in a wide range of formulations. Rhodacal® products are broadly used for high foaming products such as bubble baths, in low active formulations such as liquid hand soap. They are also recommended when special acidic stability is required, such as in personal cleansers featuring alpha- and beta-hydroxy acids.
		Rhodacal® A-246/FF	Sodium C14-16 Olefin Sulfonate	~40	Liquid	Free	

## Amino-acid & Phosphate Specialties

### Taurates selector

Presence of EOs	Alkyl chain	Product name	INCI	Actives (wt%)	Physical form	Preserv.	Properties
No	C12-C16	Geropon® TC 42LQ SB	Sodium Methyl Cocoyl Taurate	33-36	Liquid	Sodium Benzoate	Mild cleanser, it develops a creamy lather during application. It provides a “clean-rinse” sensory profile upon rinsing, imparting a soft and clean after-feel. Ideal for facial washes, men shower gels and sulfate-free shampoos. Geropon® TC-42/LQ is a liquid “salt-free” grade.
	C18	Geropon® T77	Sodium Methyl Oleyl Taurate	67-76	Powder	Free	Produces a dense and creamy lather in liquid skin cleanser, it has a good viscosity response in mild formulations. It can also be used in dry/solid products such as syndet bars.

### Sodium acyl glycinates selector

Presence of EOs	Alkyl chain	Product name	INCI	Solids (wt%)	Physical form	Preserv.	Properties
No	C12	Geropon® LG 3S	Sodium Lauroyl Glycinate	25	Pale yellow/liquid	Free	Mild cleanser designed for luxurious shower gels, shampoos and face washes. It produces a creamy lather, quick rinse during use and dramatically reduces irritation potential. Can be used in combination with other anionic, amphoteric surfactants.
	C8-C14	Geropon® CG 3S	Sodium Cocoyl Glycinate	29-31	Clear to hazy liquid	Free	

## Amino-acid & Phosphate Specialties

### Phosphate esters selector

Number of EOs	Alkyl chain	Product name	INCI	Solids (wt%)	Physical form	Preserv.	Properties
1	C12	Dermalcare® MAP L-210	Laureth-1 Phosphate	100	Low temp solid	Free	High purity monoalkyl phosphate based on a patented process. Extremely mild to the skin, alone or in association with ampoacetate surfactants. Provide cushiony lather to body washes while imparting an "easy-rinse" profile leaving the skin soft and pleasant. Dermalcare® MAP L130 and L210 are pure 100% acidic versions. Dermalcare® MAP L-213S and 213K are pre-neutralized version of Dermalcare® MAP L-210, with respectively sodium and potassium. counterions.
		Dermalcare® MAP L-213S	Sodium Laureth Phosphate	~30	Liquid	Free	
		Dermalcare® MAP L-213K	Potassium Laureth Phosphate	34-36	Clear liquid	Free	
3	C12-C16	Dermalcare® MAP L-130	Laureth-3 Phosphate	100	Low temp solid	Free	

# GEROPON® T77

## A key surfactant for sulfate free solutions

**Geropon® T-77 PC** is an anionic surfactant, Sodium Methyl Oleyl Taurate. On top of producing a dense and creamy lather in liquid skin/hair cleanser, it has a very good viscosity response in mild formulations. So it's a key surfactant for formulators to help them building chassis without sulfated surfactants answering consumer requests of having mild/respect formula.

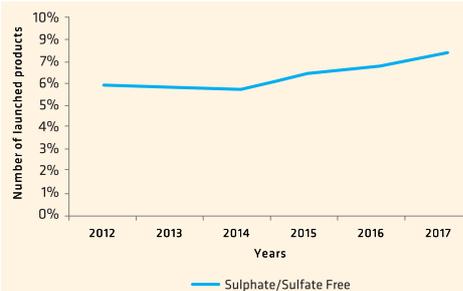
### Key features

- Provides dense and creamy foam
- Easy to process
- High viscosity response in cleansing formulations
- Allows to build mild formulations with good balance of foam and viscosity
- Preservative-free

**INCI name:** Sodium Methyl Oleyl Taurate

### Market Insight

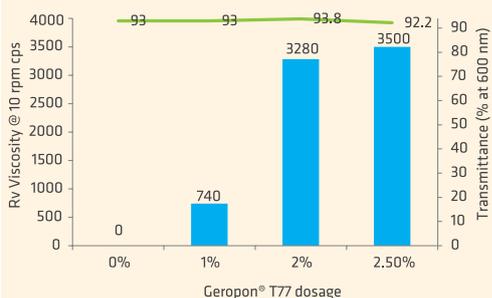
**RESPECT**  
Sulfate-free, mildness claims has never been so **STRONG**



Data extracted from Mintel GNPD for skin/hair cleanser between 2012 to 2017 in EMEA region

### Challenges to solutions

**Geropon® T77 PC** is able to thicken challenging formulations like oil-infused shampoos. It can also be used for the thickening of sulfate-free formulations

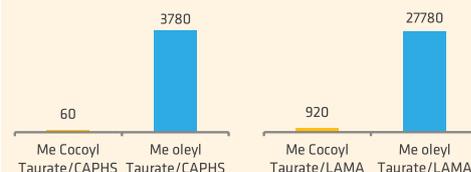


Chassis: SLS/SLES/Cocamidopropyl hydroxysultaine

### A very good viscosity response

**Geropon® T77 PC** generates a very high viscosity vs a classic surfactant Methyl cocoyl oleate

#### Brookfield Viscosity (10 RPM) mPa.s



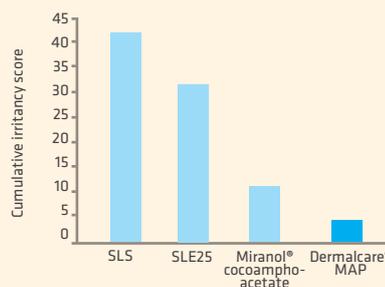
**Dermalcare® MAPs** are naturally-derived alkyl phosphates characterized by high mono-to-di ester ratios and low levels of by products, as a result of Solvay's patented phosphorylation process. Ideal for various personal care applications, they provide pleasant sensory and velvety, talc-like skin feel. They can be used to improve the mildness of cleansing formulations, even that of soaps.

Key features

- Smooth, talc-like skin feel after rinse
- Rich and luxurious foam
- Non-slippery, good rinsability
- Mild and gentle for skin
- Improve overall mildness of soap-based formulation
- Suitable for multiple applications: Body shampoo & shower gel, facial wash, make-up remover, baby care products, shaving cream & gel, hand cleaner

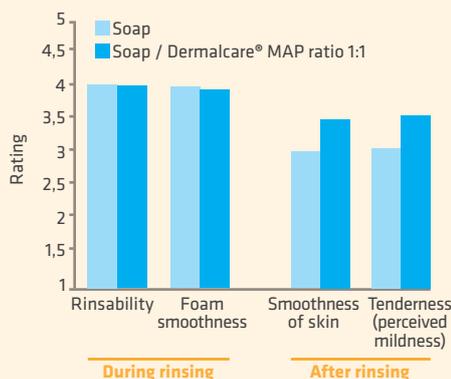
Mildness  
and  
gentleness

**Extremely mild** compared to other anionic surfactants, providing comparable mildness to amphoteric surfactants.



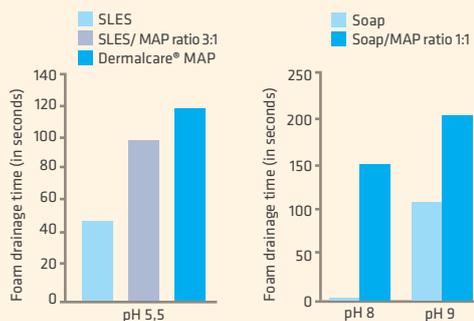
Long-lasting,  
talc-like  
feel

**Provide skin a long-lasting, talc-like feel.** When added into a soap-based formulation, Dermalcare<sup>®</sup> MAP provides the same rinsability and smooth foam during rinse-off as pure soap-based system, and delivers a post-drying sensation that leaves skin feeling smooth and soft.



Lathering  
and  
foaming

**Versatile**, they can be used in both surfactant and soap-based systems, allowing formulators to create rich, longer-lasting foam formulations.



# Amphoteric Surfactants



# Betaines

Betaines have been the standard amphoteric surfactant for over 30 years. They come in different versions, amidopropyl functionalized or not, and can be based on alkyl chains of various length. Cost-efficient, they are used as thickening and foam boosting agents. Inherently milder than anionic sulfates, they can help mollify their irritation to skin and hair.

Betaine selector				Product name	INCI	Physical form	Actives (wt%)	Special features
Amido function	Base raw materials	Preserv.	Solids level					
No	Coconut or palm	Free	Av.	Mackam® LB 35	Lauryl Betaine	Clear liquid	27-29	A biodegradable, versatile highly foaming amphoteric surfactant.
				Mackam® CB 35ULS HP	Coco-Betaine	Clear liquid	27-29	Ultra low salt grade, particularly useful in systems where salt would be an issue. Very stable in both acid and alkaline pH systems.
	Palm			Mackam® CET	Cetyl Betaine	Clear liquid	33.5-36	Long chain alkyl betaine with good viscosity-building properties and excellent pH stability.
Yes	Coconut oil	Free	Av.	Mackam® 50ULB	Cocamidopropyl Betaine	Clear liquid	37-42	COSMOS, Ecocert. A high active grade of made from a low color and odor, coconut feedstock.
				Mackam® 35 HA	Cocamidopropyl Betaine	Clear liquid	29-31	Entry grade, based on a full coconut oil cut.
				Mackam® 35UL HA	Cocamidopropyl Betaine	Clear liquid	28-30	EDTA-free, light colored, no unsaturation. Foam & viscosity booster ideal for natural products.
		MIT/MCIT		Mirataine® BET C 30	Cocamidopropyl Betaine	Clear liquid	28-30	A cost effective light colored grade. Contributes to outstanding viscosity and foam-boosting.
		DMDM hydantoin		Mackam® 35UL	Cocamidopropyl Betaine	Clear liquid	28-30	A light colored grade with no unsaturation. Outstanding viscosity building and foam-boosting.
	Palm kernel or Coconut	Sodium Benzoate	Free	Mackam® C-37	Cocamidopropyl Betaine	Clear liquid	28-32	High purity grade with a "stripped" alkyl distribution. Exceptionally low color and residual odor. Superior flash foam and viscosity building.
		Free		Mackam® DAB	Lauramidopropyl Betaine	Clear liquid	29-31	High performance grades based on pure vegetable lauric acid. Superior viscosity building over standard Lauramidopropyl Betaine. Mackam® DAB ULS "ultra Low salt" for best salt-sensitive formulations.
	Palm kernel or coconut	Free	MIT/MCIT	Mackam® DAB ULS	Lauramidopropyl Betaine	Clear liquid	29-31	Standard grade contributing to marked viscosity building and increased flash foam.
				Mackam® LMB-K	Lauramidopropyl Betaine	Clear liquid	29-31	Standard grade contributing to marked viscosity building and increased flash foam.
	Babassu oil	Benzoic Acid		Mackam® BAB	Babassuamido-Propyl Betaine	Clear liquid	34-36	Made from babassu oil grown in the Cerrado Biome from Maranhão state (North-Northeast of Brazil).

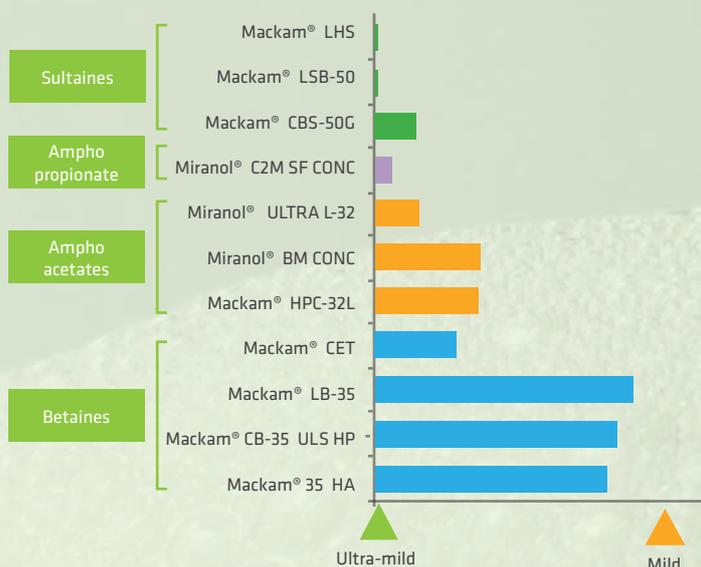
# Mild Specialty Amphoteric

Historically, amphoteric surfactants have been used by formulators for several purposes: mitigate the irritancy of the main anionic surfactant, generally sodium laureth sulfate (SLES); boost foam properties; help thicken the surfactant chassis in a cheap way, as their synergy with SLES leads to a highly salt-responsive state called “elongated” micelles.

Over the last years, the number of rinse-off cleansing formulations (ie. shampoo, bodywash, liquid soap) based on betaines and launched in North America, has been relatively stable: cocamidopropyl betaine and coco-betaine are present in approximately 75% of all the rinse-off formulations, making them by far the most used amphoteric of all times.

Mildness and foaming, however, can be further improved thanks to other amphoteric technologies, such as amphoteric acetates, sultaines and propionates.

- Variety in polar head chemistries, ie. amphoteric acetate, sultaine and amphoteric propionate
- Improved thickening in sulfated and sulfate-free chassis, as well as improved and/or tunable foam, and foam volume & texture
- Some level of conditioning by themselves (amphoteric acetates)
- Superior mildness improvements in comparison to conventional betaines



## Science corner

### Mildness tests

#### Tests used in the industry to rank surfactants with respect to their mildness

In vitro as well as in vivo tests are routinely used:

- **Zein in vitro test:** a test based on protein denaturation by a 1 wt% active surfactant solution. The less denaturated, the milder. Solvay uses the test as a screening tool for stand-alone surfactants and mixtures.
- **EpiOcular® Eye Irritation in vitro test:** an alternative to animal testing, the method measures the cytotoxicity (MTT dye conversion) to the EpiOcular tissue construct after exposure to a product.
- **HRIPT in vivo test:** the Human Repeat Insult Patch Test consists in applying a product to the skin 9 times over 3 weeks, followed by a two-week rest period after which the skin is exposed again.

# Amphoacetates

Amphoacetates are a special kind of amphoteric surfactants. Their distinctive features are their improved mildness and ability to mollify the irritation potential of other surfactants, in particular anionics sulfates. They are known to show some level of conditioning of hair and skin by themselves, and to have a synergistic effect with Solvay's cationic Jaguars®, in particular in depositing insoluble soothing actives like oils, to the skin and hair. They come in 2 different versions consisting in mono- or di-acetates, di-acetates being notably higher in solids, implying optimum transportation and use of water, for a better sustainability profile.

Amphoacetate Selector				Product name	INCI	Physical form	Actives (wt%)	Special features
Type	Base raw materials	Solids level	Preserv.					
Mono acetate	Coconut/ Palm Kernel	av.	free	Miranol® HMD	Sodium Lauroampho Acetate	Clear Liquid	33-36	Miranol® HMD is a lower viscosity grade, easy to formulate with. Miranol® HMA offers a tighter color spec. Finally, Miranol® Ultra L32 - listed on Ecocert - is the purest grade derived from a proprietary process (see Product focus on the right). Low color, mild, strong foam boosting, synergy with cationic guar to condition hair and skin.
		high		Miranol® HMA	Sodium Lauroampho Acetate	Liquid	36.5-39	
		high		Miranol® Ultra L-32	Sodium Lauroampho Acetate	Clear Liquid	38-39	
	Coconut oil	higher		Mackam® HPC-32 L	Sodium Cocoampho Acetate	Clear Liquid	38-40	High purity derived from coconut oil. Strong foam boosting, synergy with cationic guar to condition hair and skin. Mackam® 1C is the highest solids version, for improved sustainability.
		higher		Mackam® 1C	Sodium Cocoampho Acetate	Clear Liquid	43-46	
Di acetate	Coconut/ Palm Kernel	high	free	Miranol® BM conc	Disodium Lauroampho Diacetate	Clear Liquid	37-39	Derived from lauric acid. Mild, display enhanced foam and viscosity building properties over coconut fatty acid versions.
		very high		Miranol® H2M conc	Disodium Lauroampho Diacetate	Clear Liquid	49-51	
	Coconut oil	high		Mackam® 2C 75	Disodium Cocoampho Diacetate	Clear Liquid	37.5-41	Provide very good foaming in soft and hard water, as well as in presence of oils. Mackam® 2C-75 is the low viscosity grade, easy to handle. Miranol® C@M Conc is the highest solids version among amphoacetates, while Mackam® 2C offer a tighter reduce viscosity spec.
		very high		Miranol® C2M Conc NP	Disodium Cocoampho Diacetate	Clear Liquid	48-51	
		very high		Mackam® 2C	Disodium Cocoampho Diacetate	Clear Liquid	48-51	
	Wheat germ oil	low		Mackam® 2W	Disodium Wheatgerm-Ampho Diacetate	Clear Liquid	24-27	Based on natural C-18 triglycerides from either wheat germ oil (2W) or soybean oil (2S). These long chain specialty amphoacetates are better at building viscosity and milder to skin and eyes than coco/palm derived (C12) grades.
	Soybean oil	av.		Mackam® 2S	Disodium Soyampho Diacetate	Clear Liquid	35-38	

# Miranol® Ultra L-32

## The standard for purity, mildness and performance among amphoteric surfactants

Miranol® Ultra is a range of high purity amphoteric surfactants produced using Solvay patented technology. Our patented manufacturing process limits the formation of reaction by-products, thereby increasing the purity of the active surfactant. This helps you create winning formulations with better consumer perceivable attributes.

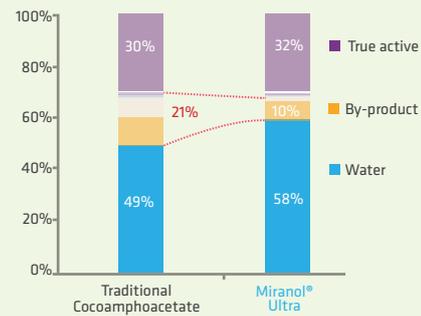
### Key features

- Excellent viscosity build: among amphoteric surfactants and compared to betaines or glucosides
- Improved foam attributes: quality, stability are improved.
- Extra mild: significantly reduce the irritation potential of anionic surfactants.
- Care for hair & skin: Enhanced conditioning thanks to their synergy with Solvay's cationic Jaguar®

**INCI name:** Miranol® Ultra L32: Sodium Lauroamphoacetate

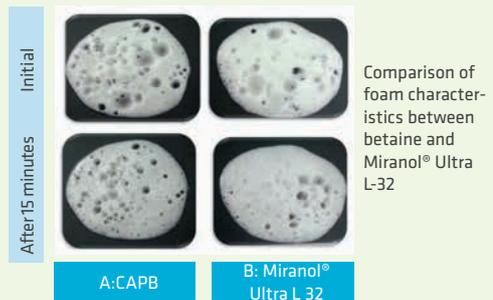
Purest standard

Miranol® Ultra has set the standard for purity, mildness and performance of amphoteric surfactants that others look up to. Miranol® Ultra contains significantly less by-products than conventional amphoteric surfactants



High foam properties

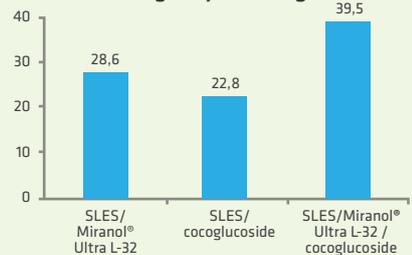
A foam that is more homogeneous, with more closely packed bubbles, of high density and long lasting. A foam perceivably richer and creamier than those of conventional betaines.



Enhance active delivery

When formulated as a co-surfactant in shampoos and personal cleansers, Miranol® Ultra actually enhances product performance by increasing the delivery of active materials to the hair and/or skin.

### Efficiency of silicone deposition on Caucasian hair, damaged by bleaching



Shampoo composition: 12% SLES / 4 % test surfactant / 0,2% Jaguar® Excel / 1% NaCl / 2% dimethicone emulsion 0.6 microns

## Sultaines & Propionates

Milder than amphotacetates, propionates are specialty amphoteric mostly used as coupling agents in formulations containing incompatible ingredients, to achieve better solubility and stability.

Sultaines, finally, are the ultimate standard among amphoteric, when it comes to mildness and ability to mollify the irritation potential of other surfactants, in particular anionics sulfates. Their use is rapidly growing in the industry, as they solve California's Proposition 65 concerns for DCA and methanol residual.

Propionate Selector						
Base raw material	Preserv.	Product name	INCI name	Physical form	Solids (wt%)	Special features
Coconut oil	free	Miranol® C2M SF conc	Disodium Cocoampho-Dipropionate	Liquid	38-40	Inherently biodegradable, salt-free and mild, it displays hydrotropic properties and is used as a coupling agent to help compatibilize conditioning agents in cleansing formulations like shampoos and body washes. Recommended to improve transparency when compulsory, such as facial cleansers, baby shampoos etc.
Coconut oil		Mackam® 2CSF	Disodium Cocoampho-Dipropionate	Clear Liquid	38-40	Salt-free grade of Disodium Cocoamphodipropionate that is most recommended for personal care applications.
Coconut / Palm Kernel		Mackam® 2CSF40 CG	Disodium Cocoampho-Dipropionate	Clear Liquid	38-40	Methanol-free and readily biodegradable version of Mackam® 2CSF, salt-free grade most recommended for personal care applications.

Sultaine Selector						
Base raw material	Preserv.	Product name	INCI name	Physical form	Solids (wt%)	Special features
Palm Kernel/ Coconut	free	Mackam® LHS	Lauryl Hydroxysultaine	Liquid	49-51	A high purity grade very stable in both acid and alkali, making it suitable for AHA cleansers and ethnic hair care products. Does not contain preservatives, antioxidants or chelants of any kind. Biodegradable, derived from renewable feed stock, with a renewable carbon index of 71%.
Palm Kernel/ Coconut		Mackam® CBS 50G	Cocamidopropyl Hydroxysultaine	Clear Liquid	48-52	A Prop-65 compliant grade derived from a fatty acid route yielding a virtually methanol-free end product. Readily biodegradable, with a high renewable carbon index of 69%.
Coconut oil		Mackam® 50 SB	Cocamidopropyl Hydroxysultaine	Clear Liquid	48-51	Glycerine-free grade that work well for quality mild shampoos, high-foaming bath products and liquid soaps. Produced from a high grade of purified, hydrogenated coco fatty acid, this grade has a particularly low color and odor and enhanced viscosity building properties.
Coconut oil		Mirataine® CBS-HA	Cocamidopropyl Hydroxysultaine	Clear Liquid	48-52	

# Methanol-free, DCA-free, high actives, Extra mild: The Standard among all Amphoteric

Made from a proprietary route based on fatty acids rather than methyl esters, Solvay's sultaines are virtually methanol-free. Naturally coming as high actives without the need for any processing aid or fluidizer, sultaines are the most sustainable amphoteric when it comes to water consumption and transportation. Their Renewable Carbon index (RCI %) can be further improved through Solvay's naturally-sourced epichlorohydrin, a key intermediate in their synthesis.

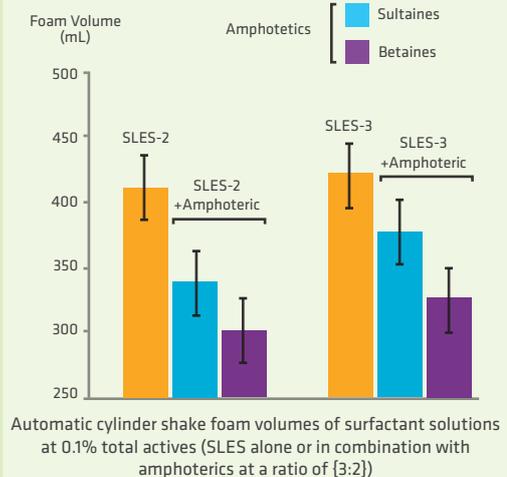
### Key features

- Higher active without the need for a fluidizer: save on freight, save water, more sustainable
- Foaming synergy with primary anionics better than betaines: Foam stability also improved.
- Mildness: EpiOcular data available shows superior mildness when formulated with sulfates, compared to betaines
- Methanol residuals: fatty acid route yields Methanol-free products
- Salt tolerance better than betaine even in the presence of soil.
- Stable on a wide pH-range, better than betaine at low pH

**INCI name:** Cocamidopropyl Hydroxysultaine

Foam improvement

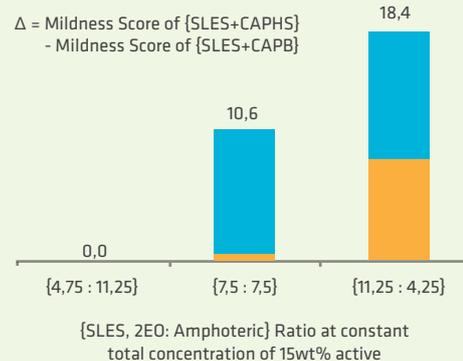
**More synergistic than conventional betaines.** Sultaines measurably help boost foam features (both stability and volumes) of different types anionics, more efficiently than classical betaines, making them the preferred choice for sulfate-free formulations.



Improved irritancy mitigation

**Superior to conventional betaines.** Sultaines reduce the irritation of common anionic sulfates more efficiently than betaines (eye mildness scores based on Epiocular irritation score).

**Eye Mildness Score Improvement from Betaine (CAPB) to Sultaine (CAPHS) in combination with a sulfate. MatTek's patented EpiOcular testing**



"The Value of Sultaines", Specialty Chemicals Magazine, Jan. 2012, Vol 32, pp. 26-28.

# Nonionic Surfactants





# Pearlizing agents

Glycol esters selector					
Product name	INCI	Physical form	Solids %	Preserv.	Properties
Mackester™ EGDS	Glycol Distearate	Flakes	67-71	Free	Provides excellent pearl effect to surfactant compositions. It is fully compatible with anionic, cationic, non-ionic and amphoteric surfactants. It helps provide body to creams and lotions. Used widely in liquid body washes, hair shampoos and conditioners, as well as skin care lotions and creams.
Mackester™ EGMS 6051	Glycol Stearate	Flakes	59-63	Free	Provides intense and stable pearly sheen to shampoos and liquid soaps. It is also used as an emulsion stabilizer and bodying agent in these systems. When used in creams and lotions, it imparts a soft as well as smooth skin feel.
Mackester™ GSV		Flakes	58-64	Free	A >85% vegetable-derived grade of Ethylene Glycol Monostearate.
Mackester™ GSTP		Flakes		Free	A high purity grade of ethylene glycol monostearate based on triple pressed stearic acid. Similar to Mackester® EGMS, the melting point is slightly lower to facilitate ease of incorporation into the desired formulation.



# Foam boosting & Structuring

## Conventional alkanolamides selector

Product name	INCI	Physical form	Solids %	Preserv.	Properties	
Mackamide® CMA	Cocamide MEA	Flake	99	Free	These monoethanolamides are highly effective viscosity builders, and will boost and stabilize foam in anionic surfactants based cleansers. Suitable for liquid and bar soap applications. Alternative to Cocamide DEA.	
Iddeol MC						
Mackamide® LMA	Lauramide MEA	Flake	99	Free		
Iddeol LMI						
Mackamide® SMV	Stearamide MEA	Flake	97	Free		Opacifying agent for aqueous based cleansers. Functions synergistically with Glycol Stearate to bring intense pearlescence.
Mackamide® CPA Flake	Cocamide MIPA	Flake	99	Free		These Alkanolamide grades develop creamy and stable foam with anionic surfactants, and are typically recommended for “DEA-Free” and “MEA-free” formulations.
Iddeol MPA						
Mackamide® LPA Flake	Lauramide MIPA	Flake	98	Free		
Mackam® BC-39	Water, Cocamidopropyl Betaine, Cocamide MEA	Liquid	38-40	DMDM hydantoin	These patented amide-ampholyte blends are easy-to-use alternatives to the high melting point CMEA. They boost and stabilize foam while improving viscosity of anionic systems. No heat is required to formulate this type of ingredient, and they can be used at the end of the process as a final viscosity adjuster. Ability to replace two components in a formulation.	
Mackadet® BC-51	Water, Coco Betaine, Cocamide MEA	Paste	48-51	Free		
Mackadet® PC-40	Water, Cocamide MEA, Sodium Cocoamphopropionate	Paste	39-42	DMDM hydantoin		
Miraspec® UB-75	Sodium Laureth-1 Sulfate and Cocamide MEA	Pourable liquid	59-66	DMDM hydantoin		



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Alkamuls® AL-S2	Steareth-2	44
Alkamuls® AL-S20	Steareth-20	44
Alkamuls® CR-H40PC	PEG-40 Hydrogenated Castor Oil	40
Alkamuls® CR-H60PC	PEG-60 Hydrogenated Castor Oil	40
Alkamuls® GC-7	PEG-7 Glyceryl Cocoate	40
Alkamuls® PEG-16 CO	PEG-18 Castor Oil Dioleate	40
Alkamuls® PSML-80PC	PEG-80 Sorbitan Laurate	40
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Mackam® 2C	Disodium Cocoampho Diacetate	64
Mackam® 2C 75	Disodium Cocoampho Diacetate	64
Mackam® 2CSF	Disodium Cocoampho-Di-propionate	66
Mackam® 2CSF40 CG	Disodium Cocoampho-Di-propionate	66
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Mackamide® CPA Flake	Cocamide MIPA	71	Mackpearl® 100	Water, Glycol Distearate, Steareth-4	13
Mackamide® LAME-100	Acetamide MEA, Lactamide MEA	48	Mackpro® KLP	Quaternium-79 Hydrolyzed Keratin Protein	25
Mackamide® LMA	Lauramide MEA	71	Mackpro® Plus RICE-C	Cocodimonium Hydroxypropyl Hydrolyzed Rice Protein	25
Mackamide® LPA Flake	Lauramide MIPA	71	Miracare® SLB 365 W	"Sodium Trideceth Sulfate, Sodium Lauroamphoacetate,	20
Mackamide® SMV	Stearamide MEA	71	Cocamide MEA"	8	17
Mackanate® EL-P	Disodium Laureth Sulfosuccinate	55	Miracare® SOFT 313	Sodium Cocoyl Glycinate, Sodium Lauroamphoacetate, Cocamidopropyl Hydroxysultaine	8
Mackanate® LO	Disodium Lauryl Sulfosuccinate	55	Miracare® 2MHT	Disodium Lauroamphodiacetate, Sodium Trideceth Sulfate, Hexylene Glycol	8
Mackanate® LO-100	Disodium Lauryl Sulfosuccinate	55	Miracare® SOFT S525	Cocamidopropyl Hydroxysultaine, Sodium Cocoyl Isethionate, Sodium Methyl Oleyl Taurate, Cocamide MIPA, Decyl glucoside	8
Mackanate® OPV-N	Disodium oleamido MIPA Sulfosuccinate	55	Miranol® BM conc	Disodium Lauroampho Diacetate	64
Mackanate® RM	Disodium Ricinoleamido MEA Sulfosuccinate	55	Miranol® C2M Conc NP	Disodium Cocoampho Diacetate	64
Mackanate® ULTRA SI	Disodium PEG-12 Dimethicone Sulfosuccinate	55	Miranol® C2M SF conc	Disodium Cocoampho-Di-propionate	66
Mackernium® CC-112P9	Isostearamidopropyl Ethyldimonium Ethosulfate and PEG 9	20	Miranol® H2M conc	Disodium Lauroampho Diacetate	64
Mackernium® SDC-85	Stearalkonium Chloride	20	Miranol® HMA	Sodium Lauroampho Acetate	64
Mackernium® SFES	Sunfloweramidopropyl Ethyldimonium Ethosulfate and PEG 9	20	Miranol® HMD	Sodium Lauroampho Acetate	64
Mackester™ PGPR	Polyglyceryl-3 Polyricinoleate	45	Miranol® Ultra L-32	Sodium Lauroampho Acetate	64
Mackester™ PGDS-LW	Polyglyceryl-3 Di-Isostearate	45	Mirapol® PQ 74	Polyquaternium-74	17
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Mirataine® BET C 30	Cocamidopropyl Betaine	62
Mirataine® CBS-HA	Cocamidopropyl Hydroxysultaine	66
Mackpearl® EQ-99	Glycol Stearate, Cocamidopropyl Betaine, Sodium Laureth Sulfate	12
Mackpro® KLP	Quaternium-79 Hydrolyzed Keratin Protein	24
Mackpro® Plus Rice-C	Cocodimonium Hydroxypropyl Hydrolyzed Rice Protein	24, 25
Mackpro® Plus Silk-C	Cocodimonium Hydroxypropyl Hydrolyzed Silk Protein	24, 25
Mackpro® Plus Wheat-C	Cocodimonium Hydroxypropyl Hydrolyzed Wheat Protein	24, 25
Mackpro® WLW	Wheat Germamidopropylidimonium Hydroxypropyl Hydrolyzed Wheat Protein	24
Mackpro® WWP	Wheat Germamidopropyl Dimethylamine Hydrolyzed Wheat Protein	24
Miracare® 2MHT	Disodium Lauroamphodiacetate, Sodium Trideceth Sulfate, Hexylene Glycol	8
Miracare® Plaisant	Sodium Cocoyl Isethionate, Sodium Lauroamphoacetate, Sodium Methyl Cocoyl Taurate	9
Miracare® SLB 345	Sodium Trideceth Sulfate, Sodium Lauroamphoacetate, Cocamide MEA	9
Miracare® SLB 365 G	Sodium Trideceth Sulfate, Sodium Lauroamphoacetate, Cocamide MEA	9
Miracare® SLB 365 J	Sodium Trideceth Sulfate, Sodium Lauroamphoacetate, Cocamide MEA	9

Miracare® SLB 365 N	Sodium Trideceth Sulfate, Sodium Lauroamphoacetate, Cocamide MEA	9
Miracare® SLB P-65	Sodium Trideceth Sulfate, Sodium Lauroamphoacetate, Cocamide MIPA	9, 11
Miracare® SOFT 313	Sodium Cocoyl glycinate, Sodium Lauroamphoacetate, Cocamidopropyl Hydroxysultaine	9, 10
Miranol® BM conc	Disodium Lauroamphodiacetate	50
Miranol® C2M Conc NP	Disodium Cocoamphodiacetate	50
Miranol® C2M SF conc	Disodium Cocoamphodipropionate	50
Miranol® H2M conc	Disodium Lauroamphodiacetate	50
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Mirapol® 550 SBB	Polyquaternium-7	17
Mirasheen® A-220	Water, Glycol distearate, Ammonium Laureth Sulfate, Ammonium, Lauryl Sulfate, Ammonium xylene sulfonate, Cocamide MEA	12
Mirasheen® S-188	Water, Glycol distearate, Sodium Laureth Sulfate, Cocamidopropyl Betaine	12
Mirasheen® SSE	Alpha olefin sulfonate, Glycol Stearate, Cocamidopropyl Betaine	12
Mirasheen® STAR K	Water, Glycol distearate, Sodium Laureth Sulfate, Myristyl alcohol, Cocamidopropyl Betaine	12
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Rhodapex® ESB 30 HA1	Sodium Laureth Sulfate	52
Rhodapex® EST 65	Sodium Trideceth Sulfate	52
Rhodapon® LX 28 HA	Sodium Lauryl Sulfate	52
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Rhodicare® T	Xanthan Gum	32
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Rhodapon® ALSA/K	Ammonium Lauryl Sulfate	40
Rhodapon® LX 28 HA	Sodium Lauryl Sulfate	40
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